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BRIEFLY TOLD.

MR. MARTIN'S QUEER ARGUMENT.—Much that is of interest to those engaged in the gas industry is appearing in our report of the 9th annual meeting of the Pacific Coast Gas Association, for at that convention virtually all of the prominent gas companies of the district covered by the Association's title were represented by delegates well qualified to represent them. In consequence the debates on the papers were of an eminently practical nature, and it is further to be remarked that, as will in fact be understood from a simple reading of the speeches in the discussion, the dialogue as a rule went right to the root of the matter in tongue. Amongst the papers read was one on the subject of "Practical Power Transmission," the preparation of which was undoubtedly the cause of the expenditure of much study, thought and time on the part of its author, Mr. John Martin, of San Francisco. Mr. Martin has for some time been engaged in the manufacture and distribution of electrical currents for lighting and power uses on the Coast, and latterly has been putting up quite some successful efforts towards the acquiring of gas plants in the towns where he or others have been trying it on through electric lighting from central stations with more or less success. He has also been interested, and is likely now concerned, in some of the California schemes for the supplying of electrical currents over long distances, generated by the harnessing of water power in remote suburban places to populous urban centers; very much like the practice now obtaining in New York State, between Niagara Falls and Buffalo. The latter reference may not be exactly applicable as a foil or set-off to Mr. Martin's presentation of some of the facts put out in his paper, but the only unfairness of the comparison lies in the knowledge that the Niagara Falls power concern does not care whether it rains or snows, safe in the certainty that water at any and all time is at its beck and command. In fact, too much water, in the shape of taking care of "tailings," is about its only hydraulic menace. However, passing from a consideration of Mr. Martin's hopes and fears regarding the snowfall and the length and eccentricities of the rainy seasons on the Coast, that which interests gas makers in California, who are also engaged in the supply of electric currents as well, is Mr. Martin's statement that they might better buy or purchase their electrical currents from some or any power transmission company than to keep on producing them themselves at a lower (and considerably lower) price than the one charged by the "transmissionors." Having read this paper very carefully, it looks that the only tenable reason that he advances for such revolutionary commercial practice is the fact that the transmission company's credit, through less loss in depreciation account, would be greater than that of the local or separate company. This reasoning, so far as the justification weight of it goes, is lamentably lame, since it seems to us that the generating and distributing systems of a local or separate company are in every sense one; and the managers of any local company who fail to provide for depreciation are rather better fitted to preside over the destinies of an opposition concern than over those of one which intends to remain permanently in a legitimate business. The discussion on the paper shows that even a man of so versatile a mind as that possessed by Mr. L. P. Lowe, failed to grasp Mr. Martin's theory and problem; and there were others whose quandary over the question was miring. Notably amongst the latter was Dr. Powers,

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of the San Diego (Cal.) Gas and Electric Light Company, whose long and honorable trading in the lighting supply of San Diego was not always a bed of down and evenness. All the Doctor wanted to know about the Martin proposition, that one should give to another a higher price for an article than the price at which the one could make it for himself, was this: "If you could give me a reason why I could afford to do so, I think I would be satisfied." And so would we. A further remarkable feature of Mr. Martin's paper is the self-complacency with which he regards the right to smash out of sight the business of others, simply by means of greater capital. Mr. Martin is also evidently a firm believer in the virtues of electric plants as better "earners" than gas plants, and that "flat rates" are better for him as an electrician than are meter rates. Now that he is becoming interested practically in the gas business he will speedily change his views in both respects.

NOTES.—The fire corps of the United Gas Improvement Company worked like heroes to save the portion of its Philadelphia plant, that was threatened for 48 hours with the flames resulting from the tremendous oil conflagration of the Atlantic Refining Company, at Point Breeze, last week. If we mistake not, President Dolan will have something practical to say later on to Superintendent Gartley respecting the hard, sustained and successful work of the latter's men.——Next spring Milford, Conn., will be supplied with gas and electric currents from Bridgeport.——According to the report of the Superintendent, the gas output in Duluth, Minn., which is under municipal control, for the half year ended July 1, 1901, exceeded that for the corresponding half of 1899 by 27 per cent.

Electromotive Force Developed between Magnetized and Unmagnetized Iron.

A recent writer says that it has been found that if two iron electrodes are placed in acidulated water, one of these, upon being magnetized, becomes positive to the other, causing an electromotive force to be set up. The experiments of Dr. Hurmuzescu have shown that up to a magnetization of 7,000 units the curve which unites the electromotive force to the strength of the magnetic field developed in the iron has a form analogous to the curve of magnetization of iron; that is, the electromotive force, increasing at first with an increase of magnetization, afterward increases more slowly. M. René Paillot has extended these researches to very intense magnetic fields, and finds that the electromotive force seems to arrive at a limit beyond which it cannot be increased by further magnetizing the iron. In order to reach this limit a very intense magnetic field was needed, and this was obtained by using the semicircular electro magnet devised by Dubois, by which in the intrapolar space a magnetic field as high as 30,000 units is obtained. The experiment was carried out with electrodes in the form of iron wire carefully annealed; these were placed in the vertical branches of a tube bent up at each end, and filled with a dilute solution of acetic or oxalic acid.

One of the branches of the tube, containing an electrode, is placed in the magnetic field between the poles, and as the lower straight portion is 12 inches long, the second branch with its electrode is entirely outside the field. The electromotive force, which was very small, was read by a Lippmann electro-capillary voltmeter, sensitive to the 10,000th part of a volt. The magnetic field was measured by the ballistic galvanometer. A number of observations were made, which agreed very closely, and the results are expressed in the following table:

Field Strength H.	Electromotive Force, Volts.
804	0.0022
1,698	.0040
3,106	.0074
5,000	.0110
8,712	.0171
10,504	.0191
12,193	.0210
17,043	.0272
20,210	0.0298
23,492	.0320
24,500	.0324
26,505	.0330
27,018	.0328
28,886	.0330
29,510	.0332
30,187	.0330

It will thus be seen that the electromotive force developed between magnetized and unmagnetized iron cannot be made to pass a certain limit. This limit, which is 0.0330 volt, is reached when the iron is magnetized to 25,000 units, and is not increased at a field strength of 30,000 units, which is about as high as can well be obtained. The value of this limit depends somewhat upon the sample of iron and the strength of the acid, but does not vary greatly from the above.

[OFFICIAL REPORT.—REVISED BY THE SECRETARY.—Continued from Page 290.]

PROCEEDINGS, NINTH ANNUAL MEETING OF THE PACIFIC COAST GAS ASSOCIATION.

HELD IN THE OFFICES OF THE SAN FRANCISCO GAS AND ELECTRIC COMPANY, JULY 16, 17 AND 18, 1901.

FIRST DAY, AFTERNOON SESSION.

The President introduced Mr. John Martin, of San Francisco, Cal., who read the following paper on

PRACTICAL POWER TRANSMISSION.

The advent of reliable, high-potential transformers and suitable line insulators for alternating currents has permitted the development of long distance transmission throughout the world during the past 6 or 7 years, and to such an extent that this character of business is assuming a standard and well merited position in manufacturing and illuminating circles.

Possibly no other State in this Union has afforded a greater opportunity for the development of long distance, electrical transmission, produced by water power, than the glorious State of California, because there is probably no other community within the borders of our grand Republic which contains so many natural resources; and yet the value of fuel has been higher with us than elsewhere.

The limitations, however, of water power transmission (and more particularly within the State mentioned) are far more marked than would appear to the casual observer. The seasons are also peculiar, and are not conducive to the maintenance of a comparatively uniform flow of water in the streams of California throughout the entire year.

As you well know, the rainfall occurs in the months of October, November, December, January, February, March and April, with a slight sprinkling in the months of September and May. These precipitations have a tendency to accumulate a reservoir, or reserve in frozen form, on the mountain sides within the State, as well as to saturate the earth, which, in some districts, affords underground storage. These reserve supplies are called forth by the action of the sun during the dry months to such an extent that it is not at all unusual to see the Sierra Nevadas on the western and southern slopes entirely devoid of snow in the latter part of the month of June, and very seldom later than the 15th of July. The rise in temperature, due to the same cause, also attracts to the surface of the earth the underground storage hereinbefore referred to, and these two sources furnish, in their limited way, practically the entire amount of water available in the streams of the State during the dry season, except where reservoirs or basins have been improvised or constructed to assist in maintaining a larger flow during the summer months than the normal flow of the streams. Realizing this as a condition over which we have no control, it is the act of prudence, on the part of any person desiring to engage in power transmission or to invest in such an enterprise, that accurate measurements should be made and taken during the extreme dry period of the year, which is usually from August 15th until, say, 10 days prior to the first precipitation of the winter or rainy season, in connection with any conservation which might be available at moderate cost as the proper basis for the installation of a plant.

To illustrate the variance in volume of flow in the various streams, I will cite three instances within my own experience of streams forming one common river, each stream being a fork thereof, the entire three streams being situated in practically the same locality and having practically the same mountainous area for frozen storage. The watershed of stream No. 1 is approximately 20 per cent. less than the combined watersheds of streams Nos. 2 and 3. The maximum flow in stream No. 1, after 4 or 5 days' continuous precipitation, will approximate 3,500,000 cubic feet per minute. The maximum flow in either streams Nos. 2 or 3 will be reached within 36 hours from the beginning of the storm, and will be maintained with a maximum flow approximating 2,000,000 cubic feet per minute.

In the month of August of an ordinary year the minimum flow in stream No. 1 approximates 25,600 cubic feet per minute, whereas the minimum flow of streams Nos. 2 or 3 will not exceed 3,000 cubic feet per minute. Realizing the proximity of these streams, and the enormous difference in these two particulars—namely, the increased length of time to reach a maximum flow in stream No. 1, comparative with streams Nos. 2 and 3, coupled with the enormous increased minimum flow of said stream No. 1—compelled the writer to seek for cause or causes which would demonstrate the "whyness" of these peculiarities. This investigation demonstrated that the formations of the watersheds

of streams Nos. 2 and 3 were practically granite throughout almost their entire area, with surface of earth ranging from 12 inches to 30 inches in depth, thereby producing a watershed with limited facilities for underground storage, and consequently affording an immediate outlet for the precipitation which had taken place. This condition accounted for the sudden and almost immediate rise to maximum in the flow of the stream. In stream No. 1 the watershed consisted very largely of gravel channels, which afforded a large underground storage; these channels absorbed the initial precipitations, which prevented the flow of water in the stream from rising to its maximum within 4 or 5 days after the initial precipitation.

The absence of underground storage in the one case and its presence in the other also accounted for the enormous increased minimum flow in stream No. 1 as compared with streams Nos. 2 and 3. The average precipitation for the entire watersheds of this stream and its tributaries ranges from a minimum of 40 inches to a maximum of 95 inches rainfall (or its snowfall equivalent) per season.

In the description of the conditions existing in this district, I am outlining to you probably the most favorable condition existing in the watershed of any stream within the confines of this State, more particularly as to the minimum and maximum precipitation; for, as we are all aware, in the southern part of the State, the minimum has been known to fall as low as 5 inches per season.

Your attention has been directed to the above description for the purpose of indicating the comparatively limited opportunity for power transmission development within our borders.

Another consideration more particularly worthy of note is the enormous fluctuation of rainfall in each season, and also the peculiarities of rainfall in any one season. While it is true that the rainy season commences in October and continues until April, the division of rainfall in these months is frequently of more importance than the total precipitation of the season, in so far as it affects the summer flow. As a large portion of the summer flow emanates from frozen storage, the peculiarities of this division might be interesting.

The value of this frozen storage depends entirely on two conditions: First, precipitation prior to January 1st; second, temperature during February and March. Snow falling prior to January 1st will become well packed and of better value for summer use, because the warm rains and increased temperatures, so common in February and March, will not reduce this storage appreciably at that time. If snowfall of any consequence is delayed until after January 1st, the weather conditions are seldom conducive to the solidification of the snowfall, and it disappears very rapidly when attacked by rising temperatures and warm rains.

The snow that falls in the early spring is usually light and fluffy, containing a much smaller percentage of moisture per cubic measure and less able by its own weight to become solidified. Therefore, the best guide to the summer flow in streams is the quantity of precipitation which has fallen during the first 3 winter months and the temperature during the succeeding 3 months rather than the season's rainfall. This is more particularly true of any watershed which is not capable of providing underground storage. Where underground storage prevails, the precipitation during the latter 3 months of the rainy season is at least equal in value to the earlier rains for summer supply to the streams.

From this you will see that a few natural conditions are favorable, and many that are unfavorable, to a reasonably large flow of water in the streams of California during the last 3 months of the dry season. In the higher elevations of many watersheds there will be found many opportunities for conservation of water by the construction of dams, and where these conditions prevail, and the storage area can be installed at reasonable cost, this supply can be depended upon and utilized to augment the materially reduced flow in the dry season.

In the streams referred to stream No. 1 has a minimum summer flow of less than nine-tenths of 1 per cent. of its maximum, while in streams Nos. 2 and 3 the minimum flow is less than one-sixth of 1 per cent. of its maximum.

The winter of 1897 and 1898 was probably the dryest in 50 years, as determined by the records of the Weather Bureau and the results in the streams, and we find, during the summer of 1898, more than half a dozen good sized power transmission plants almost entirely crippled and idle, due to a lack of water in the streams which had been normally supplying their wants, and this condition necessitated the installation of enormous steam plants, primarily to be used as auxiliaries to bolster up unfortunate installations (where the minimum flow reduced the capacity of the water power plants), in order to properly meet the requirements of their patrons. In some cases this was done to such an extent that they might more justly be termed steam plants with water power auxiliaries.

From this you will realize that the first essential necessary to success in power transmission is to be in possession of an absolutely reliable supply of water for each and every day of the year, of a minimum capacity of not less than the maximum installation of the plant utilizing the same. Had the same care been taken on the part of the early investors in this new field, the financial results to the stockholders would have been much more satisfactory.

In addition to being in possession of sufficient water to operate the plant at all times, it is essentially necessary that a sufficient market be available for the utilization of said power within reasonable cost.

The high prices which have prevailed for fuel in the past have been the great incentive for the investment of capital in transmission plants, and frequently without giving due consideration to the probability of a partial or entire removal of the market or competition from cheaper fuels. Where such conditions exist, and these plants have been installed, it merely means that the investor in said securities will be compelled to accept a smaller revenue than he had originally contemplated, or furnish additional capital for the extension of lines to available markets; but, even at the average cost of the installations which have been made, I am positive that all of the plants installed could be made to pay considerably more than their operating expenses, maintenance and repairs.

From the foregoing it might properly be assumed that the most vital feature in connection with power transmission is the question of ample supply of water.

Within the borders of this State there are now in operation electric power transmission plants making a total aggregate of more than 80,000-horse power. These plants are utilized for illumination and for almost every conceivable character of power. In the mining counties there are numerous plants operating electric hoists, pumps, stamp mills, rock breakers and gold dredgers. In the valleys many of the electric street railroads receive their entire supply from water power transmission, as well as numerous flour mills, smelters, powder works, cement works, ice factories, water works; and, in fact, almost every branch of industry is now utilizing and obtaining the benefits from the installation of electric power transmission.

When we consider that this industry is at best less than 10 years old, and attempt to appreciate the state of perfection which has been reached in such a short time, it is indeed quite remarkable. The apparatus furnished by the various companies at this time is very efficient and reliable, and in most cases almost ideal. There are many advantages obtained in factory installations by the direct application of the power to the shaft of the machines, instead of the former way of driving from one large unit, which previously entailed very large losses in belt transmission, and counter-shaft friction.

The problem of transmitting a reasonable distance and giving satisfactory service has been entirely solved, and in this connection I wish to report probably the most important electrical transmission success in the history of the science, which occurred less than 30 days ago, when current was transmitted a distance of 184 miles, from the Yuba river to San Jose, since which time it has been operating the street railroads in that city.

In the early history of power transmission, very little consideration was given to the character of pole line construction; but the weaknesses of the past were very carefully studied, and at present there is no reason why engineers should not be able to advise properly as to the character of installation throughout, including pole line construction, which will absolutely minimize interruptions of service due to bad construction.

Too much stress cannot be laid upon the advantages of proper installations, designed not only for service but for life; and at the same time there is a happy medium which can be easily determined between sound and true economy as against undue extravagance. In most parts of the State plants are operated with tangential wheels direct connected to the generators, and the cost of maintenance of this department is extremely small, except in a few cases where the water used contains debris or sand which has been deposited in the rivers, due to hydraulic mining. In these cases the wear and tear on the buckets is an additional expense of maintenance; but in no case is this expense serious, even under the worst conditions as to foreign material in the water.

The introduction of electric power transmission, and the effect which it has had or may have in our respective communities, is all important to the interests of the members of the Pacific Coast Gas Association.

As members of this Association are well aware, the writer has been quite actively engaged in fostering the introduction of electric power transmission as a desirable adjunct to the gas plants which he operates. In fact, current has been obtained on such favorable terms as to permit

of an enormous increase in the consumption of electric current for lighting, even unto tenfold of the previous demands; and while said increase was partially due to the cessation of the use of gas for illuminating purposes, yet it is with pleasure that I report that the total gas consumption is materially increased, due to a very liberal and profitable policy in the introduction of the use of gas for fuel purposes. The result has been that our total gas production in one city has increased over 30 per cent. and the electric illumination has increased over 1,000 per cent., all within a space of 3 years.

The question is frequently submitted to some of the managers producing electric current by steam, as to the advisability of contracting with power transmission companies entering their field in the utilization of electric current produced by water; and in this connection I wish to say a few words for your valuable consideration.

When an electric power company proposes to furnish you with electric current in such amounts as your requirements may call for, you are at once relieved of the responsibility, investment, care, depreciation and maintenance of an equivalent steam plant, consisting of boilers, engines, dynamos, power houses, etc.; and if the investment of a given amount of additional capital were utilized in the extension of the gas and electric departments, the total results of profit will be far greater to the local company, even assuming that the price of current offered is slightly greater than your existing cost of production, than if a similar anount had been invested in generating plants, assuming that the current from a power transmission plant were not available.

Some of our members might possibly consider that they are in a strong position to resist the onslaught of competition from water power companies, merely because they imagine the cost of power to the power company to be relatively higher than it really is, frequently underrating the ability of their competitor to successfully cope with them in competition and materially overrating their own ability to meet such competition. To all such members I wish to say that it will probably be the wise part of wisdom, and so for the interest of their stockholders and themselves, to try to reach an amicable arrangement to purchase current from the power transmission companies if possible, believing the managers of the power transmission companies will exercise the reasonable business judgment which might be expected from men in such positions.

The interests of our Association are materially and closely allied to electricity as well as gas, and there are few of us who are members of this Association but who have to devote considerable time to the electrical department.

If we will eliminate from our minds that everything electrical is mysterious, undesirable and uninviting, and merely place before our eyes suitable focusing glasses to properly see what success is being met with by the electrical fraternity, we will probably be more anxious to facilitate the united consumption of gas and electricity, rather than (as per ostrich) bury our heads in the sand while our bodies are exposed to the severe action of the elements.

Mr. Martin having finished reading his paper, the President announced that the debate on it would be postponed until the following morning, since the hour for adjournment was too close at hand to permit of a complete discussion of the different phases of the subject.

An adjournment to 10 o'clock of Weduesday was ordered.

SECOND DAY, JULY 17.—MORNING SESSION.

The Association was called to order by the President, pursuant to adjournment. The first matter to occupy the attention of the members was the following

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS,

which was read by Mr. E. C. Jones:

Mr. President and Gentlemen: Your committee appointed to consider the address of our President beg leave to report that we have carefully considered the address and recommend its adoption and publication. We consider it a most able and comprehensive paper, dealing with subjects that interest us as an Association.

We earnestly urge the adoption of the recommendations as they relate to the election to honorary membership of Professor T. S. C. Lowe, who is the "Father of water gas," and of M. Theodore Vautier, President of the International Congress of the Gas Industry, held in Paris, France, September, 1900. We do ourselves honor in extending this compliment to these gentlemen.

We concur with our President in his suggestion of the appointment of an Advisory Board within the Association, and suggest the appointment of such a Board by the President, he to act as chairman of such Board; and, in connection with this, the establishment of a headquarters in San Francisco should be left in the hands of the Board of Directors, who shall submit their decision to the Association.

The portion which refers to the conferring of the "Degree of Gas Engineer" by Universities or Schools of Mechanical Arts should be referred to a committee to report on its feasibility at our next meeting.

Respectfully submitted, E. C. JONES, JOHN CLEMENTS, O. M. GREGORY, } Committee.

On motion the address was received and placed on file, the suggestions contained therein to be acted on at a later hour.

Mr. Lowe—I believe that Cornell University, N. Y., has a gas engineering course.

The President—It is true that a number of universities have gas engineering courses, but they do not confer the degree of gas engineer.

Mr. Jones—I believe the nearest the universities come to it are the degrees of B.S. and M.E. If they have a gas engineering course these degrees generally cover it.

Mr. Martin—There is no degree known as that of electrical engineer. You would get the degree of M.S., or M.E.

The President—I appreciated these conditions, but it was my idea to make our profession a distinctive one.

Mr. Lowe—Would it not be a good plan for the Associations to get together in the discussion of this matter, and if necessary to institute for ourselves among the Gas Associations a sort of board which could confer that degree, so that it could be recognized at least among gas men.

The President—I think that is a good suggestion.

Mr. McDonald—I presume Mr. Lowe is aware that the educational department of the American Gas Association is leading up to something of that kind.

Mr. Lowe—Yes; I am familiar with its work.

Mr. E. C. Jones then presented the following

REPORT FROM THE COMMITTEE ON OBITUARIES.

In Memoriam.

Captain Elmore E. Ewing.—One of our active and much esteemed members, died in San Francisco, Cal., Oct. 20th, 1900, at the age of 60 years. Captain Ewing was born at Ewington, O., and came from a distinguished family that had given their name to his birthplace. He graduated from Ohio University in 1862, and immediately entered the Union Army as a member of the 91st Regiment of Ohio Volunteers. He served the Union cause with conspicuous bravery, and when the war ended he wore a captain's stripes, earned at Winchester and other hard fought battle fields.

During this brave soldier's latter days he suffered much from an old wound received during the war, for when he was mustered out of service he bore a scar that told of a bullet hole through the lung.

Captain Ewing was a consistent Christian gentleman and devoted much time to the work of the Central Methodist Church, of which he was a trustee, and took an active interest in the Young Men's Christian Association. He was a member of George H. Thomas Post, G.A.R., and of the Legion of Honor.

He joined the Pacific Coast Gas Association, at the fourth annual meeting, held in San Francisco, Cal., July 21st, 1896, as the Pacific Coast representative of the Welsbach Commercial Company, which position he held at the time of his death.

Capt. Ewing had considerable literary ability, and in 1899 published a volume of prose and poetry entitled "Bugles and Bells." In telling of the dead he wrote:

"The silent lips of those who sleep,
No word of gratitude can speak;
If they are conscious that we weep,
'Tis past our knowing.

But if in spirit they are near,
A quicker eye and keener ear,
Discern if we are all sincere
In honor showing."

E. C. JONES, THEO. R. PARKER, M. C. OSBORN, } Committee.

Leslie Frank Fogg.—Born February 12th, 1858, in Skowhegan, Me., he came to California with his father while a young boy and went to Trinity county, where he worked for 5 years as a miner.

In 1882 he came to San Francisco and entered the employ of Messrs. Simms & Morris. He was afterwards employed for many years as machinist by the San Francisco Gas Light Company.

He became a member of the Pacific Coast Gas Association, July 16, 1895, and the following year read a paper on the telescoping of a single

lift gasholder while in use, which he had accomplished in a novel way, it being the first recorded instance of the kind.

On December 21st, 1892, he was married to Miss Daisy E. Hughes, the daughter of his first employer in California. He died December 19, 1900, leaving a widow and four children.

Mr. Fogg was a thorough and excellent mechanic, and was intrusted with the most difficult work in gasholder construction, and much of his good work remains as a monument to his skill. He was highly esteemed by his fellows, and his death is regretted by a large circle who knew him and respected him.

E. C. Jones,
M. C. Osborn,
Theo. R. Parker, } Committee.

George Treadway Thompson.—George Treadway Thompson became a member of the Association at our last annual session. He was born September 3, 1869, and died October 1, 1900. Thirty-one years is seemingly a short period in which to establish a reputation for ability in the lines he chose to follow; but such was the case. He was advanced from position to position in the Laclede Gas Light Company, of St. Louis, Mo., until he became the Superintendent of one of their large and important stations. His membership with the several Gas Associations brought him prominently before the fraternity, and his services were solicited as an assistant in the management of the large gas interests of Mr. Emerson McMillin.

He was thorough in all departments that came under his control. Kind, genial and courteous, never faltering in the duties assigned to him, no matter how arduous, his memory is endeared to all those of the profession with whom he came in contact, either personally or by correspondence.

The Pacific Coast Gas Association wishes by this to add its expression of profound sorrow to that of our sister Associations, who have preceded us in lamenting the death of an eminently worthy gentleman.

T. R. Parker,
E. C. Jones,
M. C. Osborn, } Committee.

Message of Condolence to Mr. A. C. Humphreys.

Mr. Jones—We have also prepared a message of condolence to Mr. A. C. Humphreys, whose two sons were drowned in the Nile while abroad, the eldest son (Harold) being on his wedding trip. He came with his father to the Pacific Coast some years ago, and joined the American Gas Light Association at the last meeting in Denver, Col. He was his father's hope. His father lived for the boy, and it was his intention to make him his partner in his business.

Resolution of Sympathy.—Your Committee believe that they express the unanimous sentiment of the members of the Association in tendering our fellow member, Mr. Alex. C. Humphreys, their most profound sympathy over the untimely loss of his two sons in the river Nile during the early part of this year.

They recommend that the Secretary be instructed to tender him the deep regret and condolence of the Association in his late bereavement.

On motion of Mr. Lowe the reports were adopted, and the Secretary was instructed to send copies of the same to the families of the deceased.

Some days afterwards Secretary Grimwood forwarded the following message of condolence to Mr. Humphreys:

San Francisco, July 23, 1901.

Mr. A. C. Humphreys, Bank of Commerce Building, 31 Nassau street, N. Y.—My dear Sir: At its last meeting just held in San Francisco, California, the Pacific Coast Gas Association, by unanimous vote, desires to express to you the profound sympathy it feels for the calamity which has come upon you in the loss of your two sons.

As an honored member of the Association, your fellow members desire to say to you that your loss is keenly felt by them also. To say that every member paused in the busy period of the Association meeting to say a kindly and sympathetic word for the grieving father is but to poorly express the sympathy of the Pacific Coast Gas Association.

Very sincerely yours, J. B. Grimwood, Secretary.

Mr. Holberton read the

Report Prepared by the Committee on Library.

Your committee begs to report that it finds the suggestion to maintain a library in connection with the Association a most excellent one.

There are so many details as to the methods to be employed in building up the library and the manner of distributing books to members, that your committee would recommend the appointing annually by the President of a committee of three, and that those appointed for the ensuing year go into the matter thoroughly, and do what can be done in the way of making a beginning; also, that they obtain from the members suggestions which will assist in establishing this desirable feature.

The committee desires to express its appreciation of the appropriate gifts of Mr. E. C. Jones and Mr. Leon P. Lowe, which now form the nucleus of the library, and recommend that a vote of thanks be tendered to these gentlemen for their great interest in our welfare, and the practical method they have employed to establish our library.

J. B. Crockett,
G. H. Taylor,
Geo. C. Holberton, } Committee.

Mr. Martin moved that the report be adopted and its recommendations concurred in.

Mr. McDonald—Being President of the Western Gas Association at the time the Thompson Library came into existence, and having been then Chairman of the Library Committee, I gave this matter much careful thought, and also brought to my assistance the best talent I could find in the Western Gas Association. I would suggest that, instead of appointing a committee for a year, it might be well to appoint a permanent committee, making two or three of the officers of the Association members of the committee, so that part of the committee would change annually with the officers, and part remain permanent until death or resignation.

Mr. Lowe—That matter was considered by the committee. The idea was that the three principal officers of the Association would be the custodians of the library. This committee was to gather together a library, get ideas as to the best means of distribution of the books, etc. At the next annual meeting we would have something more tangible to work upon.

Mr. Pedersen—It seems to me if we are to have headquarters in the city, with some one in charge thereof who should be the custodian of the books, he should be a permanent member of the committee and do the distributing. If the three principal officers are the custodians, they may be here, or they may be in Oregon or in Washington. Is the idea that the books are to follow one of these officers or be left here to be distributed?

Mr. Lowe—I think Mr. Pedersen loses sight of the fact that the person in charge of the headquarters is liable to be a mere employee and not a member of the Association. We cannot afford to pay a member of the Association to occupy the position of a clerk in the rooms. Under the circumstances, I think it would hardly do to make an employee a member of the committee. If anyone is employed it will probably be a girl or a young man willing to work for a small sum.

Mr. Gregory—I think the library is certain to materialize, while the matter of headquarters is still very uncertain. I would not like to see the Association undertake to carry the two together. Take up the library first, for its success is assured.

Mr. Lowe—For the benefit of the members I will say that Mr. Jones, Mr. Grimwood and myself talked the matter over thoroughly. We knew what had been done in the Western Gas Association and approved of it, except that we thought it imposed too much of a burden on the members. I believe they require a deposit covering the cost of the book before a member can take it out. We thought the most practical way to handle the matter would be to have a list of books published (in the annual report or otherwise) and furnished to each member. A member desiring to draw a book would then write to the Secretary and ascertain what the postage would be. Upon receipt of that sum, with 8 cents for registration, the Secretary would forward the book. In due time the Secretary would receive his receipt through the post office. When the member was through with the book he could return it by registered mail. If a man was not willing to pay the small sum necessary for carriage, it would show that he did not want the book very badly.

Mr. Holberton—It might save time if the catalogue contained a list of the postal charges for each book.

Mr. Grimwood—While I believe that this should be discussed at the meeting, I really consider these matters details which should be left to the consideration of the committee appointed to establish the library. I think the first thing for us to do is to appoint a committee, or elect a committee with power to act. It might consist perhaps of the three principal officers of the Association, together with the junior past-president and three others, who would make up a pretty good sized committee. They would have full powers, and could report at the next meeting, advising as to a form of management or control for the library for the entire future. I think it is impossible at the present time to formulate any binding rules for all time.

Mr. Lowe—I think Mr. Grimwood's suggestion an excellent one. We all know Mr. Grimwood has nothing to do, and I think we can impose upon him a little extra work this year. Therefore, I move that,

in addition to appointing a committee, Mr. Grimwood be appointed librarian of the Association for the ensuing year, to report at the next session his experience in connection with the work.

Mr. Taylor—I think the motion was that the chairman appoint a committee of three.

Mr. Gregory—I want to second the motion of Mr. Lowe.

Mr. Lowe—My motion was merely to amend.

The President—I would suggest that you make it as a separate motion.

The motion that the Chair appoint a committee of three was then carried; and Mr. Lowe's motion, that Mr. Grimwood be appointed librarian for the ensuing year, with instructions to report his experience at the next meeting, was also carried.

Elected to Honorary Membership.

Mr. Jones—If it is now in order, I would like to move the election of Professor T. S. C. Lowe and M. Theo. Vautier to honorary membership in our Association. (Carried unanimously.)

Mr. Lowe—It is a very difficult matter for me to say a few words of thanks on behalf of my father, who is at present in Chicago. I know he will be deeply moved when he hears of it. He is a man who, I think, has done the gas profession some good and may be able to do it more good as time goes on. There are in addition to father in the gas business, his three sons, all in California, and all now members of the Pacific Coast Gas Association. Father has now by your much appreciated action become an honorary member of this Association—the first to recognize his work in that way. That puts us all in the Pacific Coast Gas Association. In addition to the three boys there are seven girls, and if they were eligible I am sure they would be members too.

The following report from the Committee on Nomination of Officers was then read:

Report of Committee on Nomination of Officers.

San Francisco, July 17, 1901.

To the President and Members of the Pacific Coast Gas Association: Your Nominating Committee begs leave to report and suggest the names of the following members of the Pacific Coast Gas Association to act as its officers for the ensuing year:

President—Mr. C. E. Burrows, Walla Walla, Wash.

Vice-President—Mr. M. C. Osborn, Chico, Cal.

Secy. and Treas.—Mr. J. B. Grimwood, San Francisco.

Directors—Messrs. John Martin, San Francisco; W. A. Aldrich, Spokane, Wash; Geo. S. Colquhoun, Fresno, Cal., and Frank J. Symmes, San Francisco.

Respectfully submitted,

L. P. Lowe,
O. M. Gregory,
J. W. Thomas,
} Committee.

Election of Officers.

Mr. Jones—I move that the report be accepted and placed on file, that the Secretary be instructed to cast the ballot, and that the gentlemen named be declared unanimously elected to their respective offices for the ensuing year.

Mr. Lowe—We canvassed the situation very thoroughly. We all know that when we nominate a vice-president he will be the coming president of the Association. We decided that, in choosing Mr. Osborn, we were choosing the most available man. We all know the interest he has taken in our work. We feel that in the new board of directors, too, we have chosen workers in the Association. We realize that it is necessary to have men who will get in and rustle, and we believe that we have chosen them.

The President—I am sure that Mr. Lowe voices the sentiments of every member present, particularly with reference to our President who-will-be, one year from to-day.

Mr. Jones motion was then carried, and the Secretary cast the ballot for the Association.

The President—The unanimous vote of the Association having been cast for the names read for the respective offices, I declare them duly elected for the coming fiscal year. I want to bespeak for them the support of the Association, and also to say that there is no question but that the success of the Association has been secured for another year. We will now take up the suggestions of the different committees appointed. The committee on president's address report recommending the appointment of an Advisory Board by the president, who should act as chairman of the board. As that will come entirely under the supervision of the incoming president, I will leave the appointment of the committee to Mr. Burrows.

Mr. Grimwood—If this idea of forming a headquarters for the Association is to be left in the hands of the incoming Board of Directors, I think that we should also make Mr. Britton an honorary member of that board. The suggestion emanated from him. He has not only given it thought, but he has offered to give it substantial aid, and he will have no voice in directing its affairs, as next year he does not appear as one of the officers.

The President—That will be left in the hands of the incoming president, who will appoint the members.

Mr. Lowe—The only question in my mind is whether the time is ripe for action.

The President—I would say that the question of a headquarters was not considered at all in connection with the proposition of doing away with the banquet and outing. It did not enter into it in any way. In a general discussion of this headquarters' proposition among the Directors, prior to the meeting, it was outlined somewhat as follows: That the Secretary or some committee be appointed to take up the matter of a headquarters with the different gas companies, representing to them the possible advantages to accrue by the establishment of such a headquarters, and stating the amount required to maintain it for the year. It was then to be left to the gas companies interested in the Association as to whether they would contribute, in addition to their fees for membership a certain amount, either per 1,000 feet of gas sold, or per capita of population, or in some other equitable way which would bring but a trifling cost upon some of the companies, and thereby secure sufficient money to maintain the headquarters during a year, as a trial. It had nothing whatever to do with the banquet or the outing. It was my idea that perhaps some measure of that kind could be taken up with the gas companies themselves. I believe that, upon due consideration of the advantages to accrue to every gas company by a headquarters as a source for the dissemination of information, for the making of inquiries, etc., they would see that it would more than pay for any tax which might be imposed or given voluntarily. I think the better plan would be to refer the matter of headquarters to a committee, and let them discuss it.

Mr. Lowe—Would it not be a good idea to give them power to act, if they found it desirable to establish it before we meet again. We have 67 gas companies on the Coast. I understand that the maintenance of headquarters would cost about $500 a year, which would be a matter of less than $8 apiece for the companies. Possibly it would be desirable to have this Association set aside a specific sum, and let the companies contribute, too. I have no idea that a single company on the entire Coast would refuse. The headquarters would then become a part and parcel of the Association itself.

Mr. McDonald—I trust it is not intended to bar out members of the Association who do not reside on the Pacific Coast from some participation in the headquarters.

The President—My idea was, briefly, that it would afford a place for the library and for the reference books of the Association to which any member could come. They might feel some delicacy in going into Mr. Jones' or Mr. Grimwood's office and disturbing them in their business. I know Mr. Jones would be very much pleased to have the members come, but there might be times when it would be inconvenient for both. There are times in my office when I would not like to have a man come in to spend half an hour looking over a book. The periodicals would be kept at headquarters. Every paper in the country would gladly donate a copy. A stenographer could be employed at a trifling expense to receive dictations of letters. It would be a meeting place for the members. Special inquiries in matters that gas companies might want to know about, matters that would entail lengthy correspondence with some firm in the city, could be referred to the Association and taken up by the Advisory Board. Little vexed questions could be easily settled. There is an infinitude of benefit that would arise. It is in the hands of the Board of Directors, and they no doubt will sift the matter down and decide upon the best plan. In the meantime, there is a recommendation of the Directors in which they suggest that either the banquet or the outing of each year be paid for by subscriptions of the members. What is your pleasure with respect to that recommendation?

Mr. Martin—In what shape are the finances at present?

The President—The finances of the Association are even. We have neither lost nor gained, and never aim to. The Association to-day stands with a balance of $68 to its credit, with a certainty of collecting sufficient to pay for the banquet and outing this year.

Mr. Jones—I think it would be well for the members to refresh their minds on the question of giving up the banquet last year. We came near having a riot in our midst. I believe the banquet is a good thing. If we are going to give up anything it should not be the banquet. If we are to pay for anything, we might contribute something to the out-

ing, but a banquet we ought as good Coast people to give to our boys once a year. In contradistinction to other Associations we ought not to give it up.

Mr. Martin—I move that the recommendation of the Board of Directors be not concurred in.

Mr. Lowe—I believe that we should continue to give an outing. I think that to discontinue any feature we have adopted would be the death of it. However, we must not lose sight of the fact that we have not always had money enough. Mr. Britton says that we are even on our finances, but if we had had to pay for our banquets and outings we would not have been even. There is no reason in this world why we should not always have plenty of money. It is a mere matter of members getting a move on and bringing in new members. As old ones drop out for one reason and another, new ones must come in; and unless we keep going we never will be able to maintain our current expenses. I believe that every member of this Association should constitute himself a committee to bring in a new member every year. That could not fail to put us in possession of all the money we want. It will enable us to continue our banquet, to have a magnificent outing, to build up the best gas library in the world, and to maintain our headquarters. What we want is membership, and membership means money.

Mr. Grimwood—I think that if the members are so strongly in favor of a banquet, there is no reason why an assessment should not be levied. We have spent this year on every member in attendance one and one-half times the amount of his annual dues to the Association. In regard to keeping up the finances by new members, that cannot be done. We cannot for ever keep up the finances of the Association by entertaining the old members on the fees of the new.

Mr. Lowe—We are expending the money on a few men, usually 75 or 100, but if we had 300 or 400 members and only 75 present, the expense would not increase. Some come this year, others next; but those who are not here this year, or vice versa, will pay for those who are.

Mr. Martin—I was in a very peculiar predicament yesterday. I desired to join this Association as an officer of a gas company not represented. In other institutions of a similar nature the companies themselves are members - that is, they themselves apply for membership and are entitled to a representative. If we should permit every one of the gas companies to become members, they would pay their fee and be entitled to one representative. Anyone interested in the work; other than the actual representative, would pay his dues as well. In that way we could add an income from 30 or 40 companies. I represent 7 companies that might be members as corporate bodies.

The motion to indefinitely postpone action on the recommendation of the Directors was then unanimously carried.

Mr. Lowe—In relation to the election of my father, I know that if he were here there is no matter in which he would take a keener interest than that of the establishment of this library. And on his behalf I desire to offer $50 towards the library fund. (Applause.)

A Telegram.

The President—The following telegram has just been received:

Spokane, Wash.

Pacific Coast Gas Association: Many thanks for greeting. It is the first, and I hope the last, time that I will be absent. Sorry banquet at Delmonico's not guaranteed to be cooked on a gas stove.

W. A. Aldrich.

Discussing the Paper by Mr. Martin.

The President—We will take up the discussion of Mr. Martin's paper read yesterday afternoon. Perhaps Mr. Martin would care to enlarge upon his paper to bring the matter better before the Association.

Mr. Martin—The paper was intended to give food for thought to the members, so that they might the better be able to understand what to do under the conditions which are now presenting themselves in the various cities when the transmission companies knock at their doors for the purpose of selling current, or for the purpose of effecting a consolidation of interests which may be mutually advantageous. The question which seriously affects the investor in gas as in other companies is: "How does the money invested compare with the revenues obtained?" I outlined, not very specifically, the advantages which might be gained through accepting the introduction of electric current produced from sources other than your own. The companies which are operating both gas and electric light plants find that there is a lack of desire to expend money continually in the development of the electric light department to keep in touch with the demands made by the people, for fear of some possible competition which would seriously affect their investment. To this I would say that the investment in pole lines, transformers, wire, secondary distribution, etc., is absolutely as necessary to the transmission company as it is to the company operating in any specific district. An investment of that character does not depreciate rapidly and is quite secure. It is the only investment which will bring you an increased revenue. You may operate as many generating plants as you please; unless you have means of distribution you don't get the revenue. If you will spend a given amount of money in gas and electric light distribution, instead of using that money for a generating plant and partly for distribution, you will find that the net revenue in dollars per annum will be greater because of your greatly increased sales, if a power transmission company came to assist you or to co-operate with you, even if you paid a higher price for your current than it cost you to produce it. In talking regarding the cost of production of electricity, it is seldom that anyone considers the question of depreciation, maintenance and interest on the cost of production. These things, however, appeal to the stockholder strongly. A plant capable of producing 1,000-horse power and costing initially, say, $100,000, will at once create a yearly charge of $5,000 or $6,000 for interest. Your boilers, engines and dynamos are depreciating, and the depreciation is much more rapid than in your distributing system. That is a cost in addition to the mere cost of your coal and your oil. The cost of your engineers, firemen and dynamo tenders, coupled with the cost of oil and waste, is only a part of what your current actually costs you. If you could eliminate the feature of depreciation, and the fact that your apparatus, boilers and engines are becoming out of date, you will have eliminated the worst feature in connection with electric distribution. If you can impose that upon the power transmission companies, you have solved the greatest problem in the supplying of electric current cheaply to the people of your cities. I would like a free discussion if possible, and any questions members care to ask I will be more than pleased to answer.

Mr. Lowe—I understand you think it would be advisable for a company to pay a little more for electric current—or for gas, if someone should offer to sell gas at wholesale—than the cost at which they could produce it themselves. You also say that people do not realize how much the current is really costing them, taking into consideration depreciation, etc. Now on the assumption that a well-managed company knows all about what it costs, even to the most minute details, how much more would you suggest they could afford to pay, in round terms, at wholesale for their commodity and devote their energy entirely to distribution? About what percentage?

Mr. Martin—Each individual case would have to be classed separately. But let us assume as an illustration that you have a plant costing $200,000, and that the demands of your district require the expenditure at once of say $100,000 more for a generating plant and additional distribution system to take care of a part of the customers available. There are two considerations which must be met by the party facing a condition such as I have outlined: First (assuming this to be electric power transmission), the relative increased amount of business that can be obtained by the expenditure of that $100,000 entirely for distribution, as compared with part of it being used in erecting a generating plant, and part to reach certain additional consumers; second, there is the fact of possible competition from the source indicated. The ability of an organization in any city to withstand the onslaught of competition depends upon two things: First, the percentage of business in proportion to the population or the business obtainable; second, the rates at which they are disposing of their commodity. If we will aim to place the price of our commodities as low as at all possible, consistent with active canvassing, we need never seriously fear the advent of competition, other than power transmission where the sale of current for illumination is secondary, and they are not depending upon that for their main revenue. The actual amount or percentage of increased cost over production by the plant which it would be advisable to pay, is very difficult to determine; but I wopld say that I would be willing in most cases to pay 15 per cent. or 20 per cent. more than the current would cost me, because, in addition to saving depreciation and interest on my investment, I also have an absence of investment which I can use to beter advantage. But I think that the managers of the power transmission companies are far more reasonable than I have indicated. On the assumption that the power transmission companies aim to sell to distributing companies at actual cost, including maintenance and interest, I do not think that the problem would present itself; but if it did, I think it would be advisable to do what I have suggested. If you had reached out to so many more customers, there would be a more difficult situation for your competitor to meet. If you have occupied only one-tenth of your field (as in the case of a city in which I am interested), the field would be practically vacant, and your competitor would not hesitate

nearly as long, because he sees that if he has to duplicate, it is a duplication of only one-tenth. If you have your feeders out for every customer available, his hesitation is much greater, and his desire to do business with you much greater.

Mr. Osborn—I do not think Mr. Martin has touched the heart of the matter yet. I have been employed with Mr. Martin for 3 years, and have operated 2 plants for him. We know that we give light to the consumer at a lower rate than it formerly cost to produce it by steam. We reach everyone, we wire a town expecting to get every small house in it. We reach the masses and not the classes. The man with a 7 or 8-room house will perhaps for $1 a month light it with a coal oil lamp. It costs the man with a 3 or 4-room house just as much as the man who is in better circumstances. Now we light his little home for $1 a month. With this class of consumers we get more money from a block of ground than we do in the better residence districts of our interior towns. It applies to the gas business as well. We aim to get everyone, and we don't stop as long as there is a coal oil lamp or a gasoline stove in the town.

Mr. Lowe—I think Mr. Martin's argument is a most excellent one, so far as electricity is concerned. But from the gas man's standpoint, suppose a long distance gas transmission were to approach your town, that they were able to sell gas at a low figure, and that they offered you gas at a price somewhat in excess of your own cost of manufacture—what is your answer to be on the presumption that you have the place pretty thoroughly piped? I understand that there comes the question of possible competition. Are you going to allow these people to come in and sell gas at a cheaper rate, or are you going to take their gas at their own price? It is the volume of business that permits you to reduce the price of gas. A few cents per 1,000 in the matter of cost is immaterial compared with a large difference in the sales; but here is the point, however. When the long distance man (be he electric or gas) knocks at your door, and says, "Here is my electricity or my gas," how much more can we reasonably afford to pay and entertain his proposition at once, because if we do not entertain it, he starts putting up his wires or laying his pipes? I personally know that in Mr. Martin's operations he is dealing on liberal lines, but that state of affairs is not always found. I know in a general way that when a long distance proposition was coming into San Francisco, they wished to sell their current to one of the local companies here at a price that was considerably in excess of what it could have been produced for by steam. That is a very large question. The point is, how much extra can you afford to pay? The result in San Francisco was that the matter went by the board. I refer specifically to the current of the Standard Electric Company. I know that the concerns were unable to get together. This is a question of some importance, and I believe it should be fully discussed.

The President—There are two sides to the long distance question. The one is rather in the past; the rather unsuccessful and disastrous attempts to introduce long distance transmission, and the efforts of the established companies to compete with it. Mr. Colquhoun, of Fresno, has, I think, some ideas on the darker side as a contrast to the present successful operations which Mr. Martin has been telling us of.

Mr. Colquhoun—There has been a great deal of trouble in some way with the long distance transmission at Fresno. We have lost no ground against them, but have gained. Since they came in we have gained right along. The plant in question was one of the first put in for long distance transmission.

Mr. Lowe—I understand that your company was supplying electricity as well as gas, and that the water power company undersold you to such an extent that you were compelled to close your electric light plant and fight with gas.

Mr. Colquhoun—We were furnishing arc lights only. They got down as low as $2 per month per lamp, and we simply shut down.

Mr. Lowe—Mr. Martin's situation is totally different.

Mr. Martin—I would like to ask whether the Fresno Gas Company is paying as large dividends as before. That is the all important question. Are you paying as large dividends as before.

Mr. Colquhoun—Yes, we are.

Mr. Martin—I am surprised at that. One of the men who was largely interested in the Sacramento Gas Company (which was then in opposition to the Capital Company) and was also largely interested in the Fresno Gas Company (which was fighting long distance transmission) showed me his statements; and while he was not losing money in his battle against electric power transmission he was losing the dividends which he had been earning before.

Mr. Colquhoun—I did not say that we had been paying the same dividends during all of that time.

Mr. Martin—I stated that the greatest essential to the success of a water power transmission plant was to have a supply of water for every day of the year equal to at least the maximum capacity of the plant. I know as a matter of fact that, in 1898, for some days, and I think for several months, the Fresno plant was absolutely without a drop of water to enable it to furnish any electricity whatever during that time. As people must have light, the Fresno Gas Company necessarily profited thereby. The nature of its competition was entirely different from the competition of a plant such as I spoke of. I said that if the early investors in the field had been careful in their installations, to determine that they had enough water to carry them through, they would not have lost as much money as they did. It is also a fact that the Fresno electric plant has been in the hands of a receiver in the interest of the bondholders. Since that time, however, it has been augmenting its supply of water, and is now in a more wholesome condition.

Mr. Decker—I was connected with the Fresno plant for 9 or 10 years, and I think that I can enlighten you on the situation there. The fact is that the success of the Fresno Gas Company has depended entirely upon the failure of the electric light company to put itself into a position to supply light constantly. I think Mr. Martin's paper explains the situation exactly. It was the changing character of the seasons, the amount of snow that fell at different seasons, that made the supply so unreliable. If the electric company could have gone in there with plenty of power, and could have maintained a constant service, the Fresno Gas Company would not be able to pay dividends to-day. Up to the time that the competition with electricity began we had been paying dividends regularly for years. The Fresno Gas Company fought the electric light company bitterly, and at last had to absorb the local plant. It took a long time to pay off that debt. Then the long distance power transmission came along. If this had been a success, the Gas Company would have had either to absorb it or to shake hands. The success to-day and the dividends which Mr. Colquhoun speaks of are simply due to the fact that the other company could not supply current on account of lack of water.

Mr. Lowe—I do not think that is so. During the time Mr. Decker was Superintendent, I called on him at Fresno and found that the Company was doing nothing but a lighting business at that time. Now, if the remark is limited to the lighting business, I agree. Mr. Decker had a few stoves then, and he told me what he intended to do in that line. The year after that he read a paper on the subject before the Association. I believe that 75 per cent. of the gas sold in Fresno to-day is sold for fuel purposes; and certainly the electric lighting business does not touch that. I am inclined to think that the dividends paid by the Fresno Gas Company to-day come from the gas stove and not from the gas burner, because the Welsbach burner does not burn much, and because the electric light people are doing a big business there.

Mr. Colquhoun—Our output for fuel is nothing like 75 per cent. of the total.

Mr. Lowe—But I understand that it is a very large per cent.

Mr. Colquhoun—Taking it through the year it may be a matter of 40 per cent.

Mr. Lowe—How much does it cost the consumer to run a gas burner as compared with electricity?

Mr. Colquhoun—Gas is a little cheaper for the consumer.

Dr. Powers—I entered the room only a short time ago and I did not have the pleasure of listening to Mr. Martin's paper, but I have heard some of the discussion this morning. As an interested person, I would like an answer to a question. I have a steam plant that cost me a great deal of money. Now, why should I pay Mr. Martin or anyone else more than it costs me to generate the electricity for myself. That is the question Mr. Martin tried to answer; but he did not answer it to my satisfaction, although I think he is capable of doing so. It would not be the thing to come to me and say: "You must pay us more for this current than it would cost you to generate it for yourself." But if you could give me a reason why I could afford to do so, I think I would be satisfied.

Mr. Martin—I will assume that there is not a company on the Coast but that could increase its business materially if it would extend its lines. I do not think any member of the Association will dispute that statement. Now, such an extension would require a certain amount of capital. You may make the consumer pay for it by charging him to run your lines in (which has been done by a great many companies in the past), or you may run your lines as part of your plant. Which to do is a matter for the decision of the manager in each town. If the investment is put entirely into a distributing system, by being able to reach a larger market, and consequently a larger consumption, the initial cost of the current will become a very small factor. As Mr. Lowe says in regard to gas, the question is not the cost in the holder

but the cost per consumer's meter, including not only leakage, the wages of your gas maker and the cost of material, but also your collector's salary, your manager's salary, your office rent, taxes, insurance, interest, depreciation and repairs. If you have no business, your leakage would be 100 per cent. As you increase the amount of your business, you increase your dividends more than proportionately. You can make larger profits with a smaller investment if you wipe out the necessity for the installation of a generating plant.

Mr. Lowe—Mr. Martin pursues a most excellent policy. He says, "You shall not burn gas for light;" but he does not put it in those words. The reason is, electricity is really the cheapest. Now there is no use discussing the question for a moment as to the comparative convenience of electricity over gas. Electricity is the most convenient light in the world; and when the gas man forces in gas over electricity, he does it because gas is absolutely the cheapest. If he cannot do it under those conditions, he cannot do it all. Mr. Martin makes his electric light cheaper than his gas, notwithstanding that gas is at a moderately low rate.

Mr. Martin—I may say that our fuel gas business has increased 2,000 per cent. or more. While our sales for illumination have decreased from 15,000 or 16,000 feet a day to 3,000 or 4,000 feet, our sales for fuel have increased from nothing to 17,000 feet.

Mr. Lowe—Which do you expect ultimately to be the best business?

Mr. Martin—I consider the two jointly. I do not think there ought to be a gas plant without an electric light plant, or an electric light plant without a gas plant.

Mr. Lowe—When you light on a flat rate, is there not a limit to your lighting business when you have occupied the whole field?

Mr. Martin—There is no limit, because there is always a natural growth. In this connection I may cite an instance from my own business in Marysville. After our hard fight with our friend, Mr. Knight, my associate said to my Manager: "How much more business is there to be obtained in the city of Marysville?" He replied: "I don't think we can get more than $100 worth per month in excess of what we are now doing." I ridiculed the idea and told them they did not know what they were talking about. I am pleased to say that our monthly income to-day is more than $400 larger than it was then. The business has increased during the past 12 months since there has been a consolidation at the rate of over $300 per month on the average. We have not reached the limit, and we never shall reach it.

Mr. Lowe—Which do you consider the more profitable department of your business?

Mr. Martin—The electrical department is the more profitable, for two reasons: First, because we do not have the cost of a generating plant to carry—that has been entirely eliminated in our case in Marysville; second, because we push gas for fuel purposes only, but we do push it hard for that. We assume that the two are partners, and not in opposition. The advantage of flat rates in electricity is that you are educating the people to make their homes cheerful. When they dine with you they see the room ablaze. They go home to their dingy gas burners and say: "I think I can stand 50 cents more a month for the sake of a cheerful home." Where we put in 3 lights for $1, that man will have 5 or 10 within the year. We get a natural increase within the homes themselves, due to the cultivation of a desire for brilliant lighting.

Mr. Lowe—Will a domestic consumer pay you more actual profit on the gas business, on the assumption that he uses his gas more for fuel purposes?

Mr. Martin—No; I think the electric lighting is more profitable for these reasons: First, because the cost per service installed in one case is much less than in the other; second, because there are numerous places where illumination is necessary where fuel is not; as, for example, boarding houses, rooming houses, lawyers' offices, etc. They would necessarily have to have illumination at night, but there are very few days when heating is necessary in our warm interior towns.

Mr. Lowe—I limited my question to domestic use.

Mr. Martin—Under the conditions which exist in the valleys of central California the profits to be obtained from fuel alone are much less than the profits to be obtained from the same building for illumination alone. We hope some day, however, to be able to build up our gas business so that it will be as profitable as our electric light business. Our gas department is profitable, but yet not as profitable as our electric department. We now have under discussion the proposition of reducing the price of gas. The people in our towns lay in their supply of fuel in September and October for the entire winter, and it is to forestall that purchase of wood that we may make a further reduction in the price of our gas for fuel purposes.

Mr. Lowe—I think Mr. Martin owes me a vote of thanks. His talk is very much better than his excellent paper.

Mr. Osborn—I want to correct the idea regarding the price of current as my Company sells it, as compared with the price of gas used through a Welsbach burner. The matter regulates itself in this way: A store closing at 7 or 8 o'clock will have a prepayment meter set, and will use gas because it is cheaper. You might reasonably suppose that we could furnish current to a consumer who uses it only until 8 o'clock cheaper than we could to one who burns it all night. But we do not care if it is burned continuously. Our prices are the same for the 8 o'clock consumer, for the 12 o'clock consumer, and for the all-night consumer. Now the 8 o'clock consumer with a Welsbach burner and $2.50 gas may cut his bill a little by strict economy. The man who burns his lights until 12 o'clock will be as well off as if he were burning $1 gas. The man who burns the current all night will pay a price equivalent to 50 cent gas with a Welsbach burner, provided he used the gas as much as he does the current. I suppose every member has tried consumers on a flat rate. With our electricity on a flat rate they use more light in 1 day than they would use in a week with gas.

Mr. Lowe—I think it would be well if Mr. Martin would explain to the Association the arrangements he has for buying current from his wholesale company. He has an excellent method. I believe he buys it on a sort of pro rata basis, depending upon the revenue. Suppose you had to generate your current by steam, Mr. Martin, could you afford to sell it at a flat rate?

Mr. Martin—The arrangement I have with one of the companies from whom I receive current (it is the larger of the two companies with which I have contracts, and covers more ground), is that they are to get a per cent. of my gross income. If I collect $1 a certain part of that dollar goes to them; so that with the amount of business I do my profits increase, and the profits of the wholesale company increase correspondingly. At the same time the power company insisted on putting into my contract a maximum price that I would be permitted to charge for light, so that my rates would be cheap enough. What they want is a large consumption. The liberal use of light, although apparently extravagant, is not so in reality. The price which the power company gets from us on this percentage basis is larger than their contract price with others for illumination by the k.w. hour. The only advantage is the flexibility, placing me in a position to successfully resist competition, since the power company is sharing in my gross income. That is an advantage. With a fixed price, too, I could not make a contract for 40 years. It is a partnership proposition only to the extent that we both share in the revenue.

Mr. Osborn—We took charge in Chico last February, and by the 1st of September we were paying the power company more for power than was taken in in gross on February 1st.

[To be Continued.]

A New Type of Scrubber.

[A paper prepared for the North British Association of Gas Managers, by Mr. R. W. B. Cleeke.]

Like other sections of the plant used in modern gas works the apparatus employed to effect the abstraction of the ammonia has undergone many alterations, tending to increase its efficiency as well as reduce its cost. It may be of interest to trace, as far as possible, the principal changes that have taken place from time to time, and so altered the scrubber that in its most perfect form it is so unlike its predecessors in shape and construction as to retain little or no resemblance to them, except in the functions it is called upon to perform—namely, to abstract from the crude gas the contaminating ingredients, ammonia, carbonic acid, sulphuretted hydrogen, etc.

It may, however, be necessary, for the purpose of this short paper, to define the essential difference between a scrubber and a washer. In a scrubber, the gas is acted upon by coming into contact with wetted surfaces; whereas in a washer the gas is always passed through the body of the purifying liquid in one way or another. The washer was made use of some time before the scrubber was invented, and there are many instances of early patents for its improvement—viz., Daniel Wilson, 1817, John Hobbins, 1824, etc.

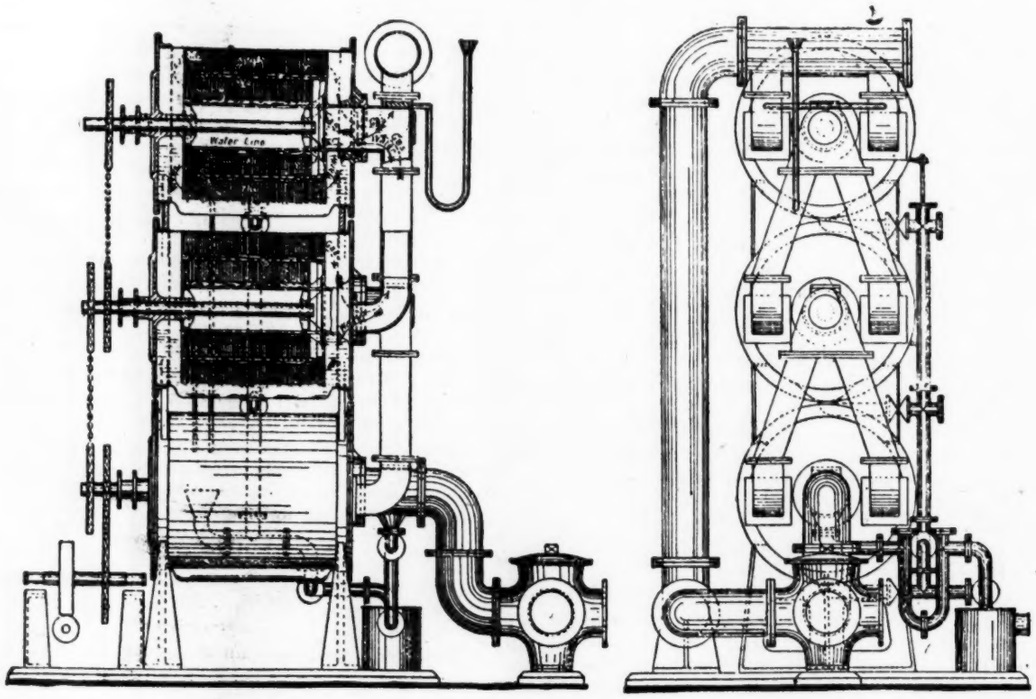
In the first edition of the "Treatise on the Manufacture of Coal Gas," by Mr. Clegg, the younger, published by Messrs. Weale in 1841, no mention is made of any form of scrubber, although at this date the manufacture of gas for lighting purposes was carried on to a considerable extent throughout the country. In "King's Treatise on Coal

Gas," it is stated that the prototype of the scrubber was the apparatus constructed by a Mr. Gossage in 1836; but this, although to all intents and purposes a tower scrubber, was used for the decomposition of common salt. I find, however, that previously to this, on August 17, 1835, Mr. Henry Phillips obtained a patent for an apparatus in connection with the purification of illuminating gas by the abstraction of ammonia; the gas being passed through a vessel fitted with trays on which were laid "refuse, tan, twigs, coke, hair, or other such substances, kept wetted with saline solution, dropped down through a perforated plate." Curiously enough, this vessel is recommended to be used after the ordinary purifiers; but it is to all intents and purposes a scrubber. It would also appear that shortly after this scrubbers of some sort were employed, for in 1846 we find that Mr. George Lowe, of London, took out a patent in connection with them for improvements dealing mainly with the apparatus for the distribution of the water. The scrubber so improved consisted of an upright vessel in two sections, containing coke wetted with water and weak liquor, through which the gas was passed. In 1848, Mr. F. C. Hills obtained a patent for a scrubber, and an improvement on this was erected by Messrs. Walker at Blackfriars, London, which seems to have been the first really effective description of scrubber. This was of the tower type, filled with coke, with an improved form of water distributor. Afterwards, Messrs. Walker, in conjunction with Mr. Mann, made considerable improvements in the scrubber. The water distributing apparatus was driven by steam power. Later on the scrubber was divided throughout its height into several sections, and at the top of each the descending liquor was caught and redistributed, and the efficiency of the apparatus rendered perfect, but at the expense of greatly increased dimensions. Broken bricks or coke have been used from the first for filling the towers; but later on Mr. George Livesey, of London, introduced the timber filling, generally known as "Livesey boards." This class of scrubber, gradually perfected since its first inception in 1835, with various minor modifications in shape and construction, has been generally adopted.

The chief difficulty encountered in the working of the earlier scrubbers was in the arrangements for distributing the water or purifying liquid over the scrubbing material, generally owing to the holes in the distribution-pipes filling up. And the equal saturation of the coke, etc., by this or other usual means, is a matter into which enters so large an element of chance, that it is very doubtful if the whole of the scrubbing material comes into action. In consequence of the many difficulties and defects, attempts have been made by various gas engineers to substitute some form of mechanical or active scrubber for the inert masses of coke, etc., contained in the towers in use.

In 1861, a Mr. Cowper patented an apparatus which consisted of concentric horizontal cylinders of wire gauze revolving in water, in which they were partially immersed, the gas passing from the inner to the outer cylinders. Mr. Whimster, of Perth, devised a rotary exhauster, which, to a certain degree, acted as a scrubber also. Mr. Reid, of the Leith Gas Works, and Mr. Still, of the Chartered Gas Company, London, constructed vessels in which, by means of rotating blades or buckets, liquid was applied to the passing gas. But none of these machines appear to have been sufficiently effective to cause their further adoption. The two last named were really washers, not scrubbers. It seems to have been reserved for Mr. George Anderson, of London, a Scotsman by birth, to construct the first really effective mechanical scrubber. His patent is dated Aug. 12, 1875, and the scrubber consisted of cylinders formed with wooden staves. On the outside of these staves was secured vegetable fiber, about 5 inches long, suitably arranged.

The cylinders or brushes were inclosed in separate cases, rotated mechanically in the purifying liquid, and the gas traveled from the lower to the upper case throughout the series, passing across the brushes and in a direction contrary to that of their rotation. The selection of this fiber was very fortunate, as, besides being practically indestructible through any deleterious action which the gas or water may have upon it, the fiber or bristle form is certainly that best adapted for the purpose, as none of the gas or water can possibly escape its action; and to this



fortunate choice of material we are, no doubt, indebted for the progress of the mechanical scrubber.

The action of this scrubber was very successful, and was quickly followed by inventions of a similar class, all adopting the principle of rotating the scrubbing surfaces in liquid, and passing them so wetted through the gas. Notable among these must be mentioned the "Standard" scrubber of Messrs. Kirkham, Hulett, and Chandler, the patents for which were taken out in 1887, and later the scrubber constructed by Messrs. Holmes, of Huddersfield, in both of which the gas circulates in a radial direction through compact disks of scrubbing material rotated on a central shaft; the containing vessel being divided by vertical plates into numerous separate chambers, while the liquid is allowed to flow successively through the chambers in a direction reverse to the passage of the gas. There are other scrubbers of somewhat similar type—namely, the "Eclipse" of Messrs. Clapham Bros., Limited, etc., and one other (a distinctive type), that introduced by Messrs. Walker in 1888, which has a reciprocating action, whereby a series of wooden grids, similar to the well-known Livesey boards, are alternately immersed in liquid and exposed wetted to the passing gas, the boards being arranged in a series of chambers communicating one with the other in a regular sequence.

The result of the various developments and improvements here briefly mentioned has been to change the scrubber from a somewhat crude and

exceedingly bulky piece of apparatus to a compact, well contrived, highly efficient machine, doing its work with certainty. To illustrate this, it may be pointed out that, according to the formula of a well-known gas engineer, to deal with a million cubic feet of gas per diem, tower scrubbers having a cubic capacity of 9,000 feet are required; while with an efficient scrubbing machine the cubic capacity need not exceed 560 feet—the comparison being nearly as 17:1 in favor of the latter, and the price reduced by one-half.

In placing before you these few notes, I have not considered it necessary to do more than merely indicate the various forms the scrubber has taken, as their mechanical structure and the general chemical action of all scrubbers, in whatever degree, are fully detailed in the numerous excellent handbooks on the manufacture of coal gas, and any further description from me would be unnecessary. I trust, however, you will now permit me to bring more particularly to your notice a new arrangement of machine scrubber, in the hope that it may be of interest to you.

This scrubber is an advanced type of the brush class of machine. The scrubbing material used is the same as in the original, and now generally considered to be the most suitable for the purpose. It consists of two or more steel cylinders with closed ends, placed horizontally; and arranged one above the other. Each is provided with a gas inlet port at the center and one end; while at a lower level, and on either side of the inlet, are provided two outlet ports. These outlets in the lower cylinder communicate, by means of suitable connecting pipes, with the inlet of the cylinder immediately above. In each cylinder is placed a compound or annular brush. This is formed with a cast iron ring at either end, secured to a central shaft, which is carried in suitable bearings at the end.

These rings have two ledges, one at the outer circumference, the other at a suitable distance towards the center. On these ledges are secured wood staves, to which are fixed the fibrous scrubbing material; thus forming two cylindrical brushes, one being within the other. The annular space formed between the outside of the inner brush staves and the inside of the outer is placed in direct communication, by means of a circular mouthpiece, with the inlet port at the end of the containing cylinder.

The other end of this annular space, between the two brushes, is left open, and both ends of the drum on which the inner brush is fixed, are closed gas tight. The gas, being admitted at the inlet, passes along through the inner annular space, escaping at the end, whence it returns along the surface of the outer brush, through the outer annular space, and down to the outlet ports, and so is conducted to the inlet of the brush, immediately above it, where it passes along the annular space, and so on, over the outer brush to the outlets, as before, until it finally escapes to the main pipes.

The cylinders are filled with liquid up to the level of the inlet mouths of the inner brushes, which act as overflows, allowing it to run in rotation from the higher to the lower brush. The brushes, being revolved in the liquid, continually supply a series of well wetted surfaces, which are so brought into the most intimate contact with the passing gas. The foul gas, flowing into the bottom cylinder first, is there met by the strongest liquor, and flows upwards through the various cylinders, being met in the last by a stream of clean water. The brushes are revolved by means of Leys' patent chain gearing, and the lower brush may make two or more revolutions to each revolution of the upper brush. The containing cylinders are made considerably longer than the brushes, so that the gas, at each reversal of direction, expands into a large chamber after each contact with the scrubbing material. A system of pipes with suitable stop valves is provided, connected to the clearing trough at the bottom of each cylinder, whereby the liquid can be run from the upper to the lower for testing purposes, or entirely run off, as may be required.

Some of the advantages to be derived from this compound or annular system of brushes, contained in separate cylinders, placed one above the other, are:

(1) The ease with which any brush section can be stopped and withdrawn for examination or cleaning, while the remaining sections can, with very little delay, be continued in full operation.

(2) The large amount of scrubbing surface through which the gas passes in traversing the brushes.

(3) The facility given for revolving at varying speeds, allowing, when necessary, the extra scrubbing of the gas in the stronger liquors, and thereby adding to the efficiency of the apparatus in removing carbonic acid, sulphuretted hydrogen, etc., from the gas.

(4) The ease with which the capacity of the scrubber can be increased at any time by simply adding an additional cylinder as required.

It is not my purpose to say anything as to the use and action of washers; but I may state that a washer, or, more properly speaking, tar extractor, should be used in connection with, although not necessarily forming a part of, the scrubber. There are two distinct types of washers—viz.:

(1) That in which the gas is made to pass through water in a series of distinct operations, one passage following the other, and which necessarily causes the pressure to accumulate or increase with each operation.

(2) That in which the gas is divided up into several main currents, and so passed, at one operation, through the liquid in many minute streams; thus the pressure need not exceed ½ inch. The second class should, therefore, in all cases be adopted.

I trust, gentlemen, these few notes on one of the very important and essential sections of the apparatus placed under your control may have interested you in some small degree. It had been my wish to have made this paper more complete by placing on record the results of certain experiments which I intended to have carried out, and to have given you an account of the chemical results of the action of the machine I have specially discussed; but I regret I am unable at present to do so. If, however, your Committee will allow me to again trespass on your time at a future meeting of the Association, I hope to have the pleasure of laying before you a record of these experiments and tests, in which I shall have the kind assistance of our fellow member, Mr. M'Pherson, who has been good enough to undertake the reading of this paper for me.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, August 10, 1901.

Société Technique du Gaz en France.—A Casualty List.

The annual meeting of this Society was a special event of last month, from a British point of view. I always endeavor to say "British" instead of "English," because some of our friends in Scotland, Ireland and Wales think that the latter term is too exclusive. So please understand that if by a slip of the pen I follow the usual custom and write "English," I really mean "British," and certainly do not wish to ignore our associates in the sister countries. And now I am entering on an international subject, an opportune occasion for this interpolation is afforded. For one thing, our French neighbors came as close to England to hold their meeting as was possible, seeing that they selected Dieppe, and met in a hall by the sea, which is as near as they could come without actually donning bathing costumes and holding a session in the arms of Neptune, which is the usual reporter's English (not British this time) for "in the sea."

In these days of novelties, and anything for a new sensation, there may be something in the notion of a meeting under such circumstances. It is not patented and I make it a present for what it is worth to the profession at large. But not content with this, they followed up the meeting by crossing the channel and taking a three days' recess in Britain. The party numbered nearly 100 strong, and proceeded first to Brighton, where they received every courtesy from the Brighton Gas Company. They were shown over the works and entertained at luncheon in the principal public rooms. Proceeding to London, they were the guests, in the evening, of three English Companies having works in France, viz., the Imperial Continental, the Continental Union and the European Gas Companies, who provided a banquet well worthy of the occasion, and the usual toast list consisted largely of an exchange of international courtesies. The programme for the following day had been arranged by the three London Gas Companies, the Gas Light and Coke, the South Metropolitan and the Commercial.

The party commenced with a steamboat trip down the Thames to the large gas works at Beckton, a journey of some 15 miles, which afforded excellent opportunity for viewing many objects of interest. Here a special feature was the military band composed entirely of Beckton employees, who received the visitors on landing with the strains of the "Marseillaise," and also enlivened the proceedings by a selection of music at luncheon and on other occasions throughout the visit. Other interesting items in the programme, in addition to the usual inspection, were a parade of 29 locomotives and 40 horses, a display of the works' fire brigade and ambulance association. No other gas works in the world can offer similar attractions to visitors. The works were decorated with designs in which English and French colors were combined, and the French tricolor waved a courteous welcome to the visitors from the

top of the clock tower. The departure was an event not easily forgotten.

Large crowds of the workmen, evidently let off for the occasion, followed up the strains of "Auld Lang Syne" from the band with genuine British cheers—and the Beckton men *can* cheer. The party then proceeded to inspect the works of the South Metropolitan Gas Company at East Greenwich, and subsequently were entertained at dinner by the three Companies above named, at the well-known "Ship" hotel at Greenwich. A feature of the next day was an elegant luncheon at the Hotel Cecil, provided by the Gas Institute and the Institution of Gas Engineers, and in the evening the party returned to France.

With the continual reduction of the time required to make the journey between London and New York, one may venture to hope that the time is not far distant when a visit from the American Institution of Gas Engineers, of a similar character, will be the chief item for the year.

The Société Technique includes 20 honorary, 500 ordinary, and 106 associate members and is comparatively well to do as compared with similar Associations. The receipts during the year were nearly £2,000, and the expenses £422 more, the deficiency being chiefly made up of extraordinary expenditure incidental to the International Congress.

The Société, being possessed of a comfortable nest egg amounting to £8,150, can easily afford this excess, but at the same time British and American visitors will not fail to appreciate the fact that no expense was spared in making the Congress of 1900 a success. The French Association spent during the year 1900, nearly £1,000 on publications, which amounted to more than £1 10s. per member. This large sum may be due to the special event of the year. As the income of the Société is about £3 per member, we may infer that the French gas companies are more liberal in recognizing the claims of the same, than is the case here. The bulk of the income of our Associations is derived from the subscriptions paid by the members. Many gas companies even begrudge their engineer the necessary time for attending Association meetings, to say nothing of allowing his expenses. But I go the length of saying that the gas company should not only send their engineer to the meeting free of expense, but also pay his subscription.

The gas engineer may benefit indirectly in the long run by the advancement of our industry, but the shareholders of the gas undertakings secure a direct and immediate advantage, and therefore it is not unreasonable to say that they ought to bear the bulk of the expenses connected with attending and working the Association. There are other unique features in the proceedings of the Société which follow as a consequence upon the substantial income just mentioned. A very pleasing feature was the presentation of 46 prizes of £20 each awarded to foreman and workmen who furnished the longest and best records of service, and these were supplemented by 17 medals presented by the French Government. This list of prize winners was headed by M. Ferdinand Lumel, chief accountant of the Union des Gaz Company, who had a 47 years' record. Both the Société and the French Government are to be congratulated on their good judgment in recognizing the merits of a deserving class, who are not able to secure more than a modest competence, but yet form the backbone of commercial and public life.

Where would the millionaire be without his patient, plodding clerks, who are content to stoop over the ledgers for 8 hours a day, and while receiving bare workman's pay, accept the discharge of enormous responsibilities. Peace has its heroes as well as war, and the man who steadily plods in a small round may be as deserving of public recognition as the soldier who, under the frenzy of battle fever, accomplishes some reckless and daring deed, for once in a lifetime. Money prizes were also presented for "a really practical automatic lighting and extinguishing burner," for artistic gaseliers, and for an improved filling for service pipes.

The subjects treated in the papers and communications submitted for discussion were similar to those dealt with by English-speaking assemblies of gas managers. There was a description of a hand charging machine for small works, a paper on the "Mechanical Conveying of Coal and Coke," a reference to the use of expanded metal for the construction of purfier boxes, an account of Breittmayer's process for the removal of naphthaline, a high-class paper on the photometry of incandescent mantles, a reference to the latest developments of the Welsbach patents, and a paper on cold carburetting of gas and of air, in the course of which it was stated that carburetted air gas of a quality superior to acetylene was supplied at 18 districts in France. The author made out a strong case in favor of benzol as an enricher for coal gas, Another paper dealt with the enrichment of coal gas and its influence on the calorific power. A third communication of a similar character was devoted to the subject of benzol as an enriching material. An apparatus for lighting gas burners at a distance was described, and a series of experiments undertaken with a view of obtaining some information on the influence of the physical condition of coal on the quality of the products.

Samples of large, average, small and powdered coal were tested. Water gas did not pass unnoticed and several minor contributions were submitted, some approaching to the "Wrinkle" which appears to be an established feature in America. Altogether there were considerably over a dozen papers, and that without taking up commercial questions or dealings with the consumers. Apparently there is not much trouble from oil and electricity in France, nor is there the demand for cheap gas that has been such a prominent item in the history of the gas industry both in Britain and America. Cheapness is not everything, and while it is a help towards business, there never was a greater demand for luxury and for labor saving appliances than at the present time, and it is even more important that the purity should be beyond suspicion and the quality well adapted to the purposes for which it is to be used than that it should be cheap. In fact too much insistence on the virtue of cheapness may have a bad effect, because a really good article will demand its price. So that perhaps our friends in France may do as well for themselves and for their customers by selling a good article at a substantial price as by seeking to move heaven and earth in order to secure cheapness. One would also like to know the methods adopted by the Société in order to secure papers, seeing that no British Association could get together half the number. And with this reflection I will take leave of the Société Technique.

The last few weeks have been notable for quite a shoal of accidents, fatal and otherwise, in connection with gas supply, forming quite an exception to the immunity that usually prevails. A serious explosion occurred at a corn mill near Edinburgh, which resulted in 5 deaths, injury to nearly 20 persons, and great damage to property, the premises being practically burned out. A gas engine had been thrown out of use for some weeks, but allowed to remain connected up to the meter and service, the latter being 3 inches diameter. It was sold to another firm, and the purchaser sent a competent foreman and staff of men to remove it.

No direct evidence is now available as to the cause of the explosion, beyond the fact that it followed upon the removal of the inlet connection to the meter. As there was no necessity to go beyond the outlet of the meter the probability is that there was some mistake as to the arrangement of the pipes, as, according to the regulation prevalent in that city, no private individual is allowed to interfere with the connections on the inlet side of the meter, at any rate without first obtaining permission to do so at the gas offices, and no notice or request was received prior to the accident. Just before the occurrence one of the party borrowed a chisel and a lamp, complaining that the electric lamp in the engine room was not sufficient, and as fresh chisel marks were found on the inlet coupling of the meter, the presumption is that the chisel was used to start the joint, which had not been uncoupled for several years and was set hard.

The jury found that the deceased were killed by an explosion of gas, caused by a great escape from the pipe just referred to. In a miner's cottage near Leeds gas escaped from a fracture in the main outside and accumulated under the stone flagged floor of the kitchen. It was ignited at a fire just started under the family copper, and a miniature earthquake followed, the floor being heaved up, to the great alarm, but fortunately not very serious injury, of the occupants. A light building used as a theater was totally destroyed by fire, and as it happened to be situated in the near vicinity of the largest holder at the Longborough gas works, some alarm was caused as to the safety of the holder and of the neighborhood. By energetic action on the part of the fire brigade, however, danger from that source was averted, though the holder became so hot that the showers of water flung upon it were instantly converted into steam. In London a man was suffocated by an escape in his bedroom under singular circumstances. He used a portable burner supplied by flexible tubing, and in drawing it towards him for the purpose of extinguishing it the last thing at night, pulled it too far and dragged the tube off the nipple, and apparently went to sleep without being aware of the mishap. One man has been killed and two others injured by the falling of a scaffold used in connection with the erection of a new holder at the Reading gas works.

THE Rivershore Gas Company, of Riverton, N. J., has extended its main system to the borough of Stanwick.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

DR. F. S. SCHNIEWIND, of the United Coke and Gas Company, informs us that it has, in addition to the contract for 200 ovens of the Schniewind type, for the Maryland Steel Company, at Sparrows' Point, Md., closed a contract with the Michigan Alkali Company for the erection of 15 ovens at Wyandotte, Mich. The coke will be used for the burning of lime, and the gas and ammonia will be used in the manufacture of soda ash. Tar will be the only product for sale in open market.

MR. WILLIAM A. WILSON has been appointed Superintendent of the American Gas Company's property at Portage, Wis.

THE Directors of the Laclede Gas Light Company, of St. Louis, Mo., have declared a dividend of 2 per cent. on the common stock. It is payable the 16th prox.

THE third largest taxpaying corporation in Chelsea, Mass., this year is the Chelsea Gas Light Company, whose payment to the sustaining of the municipality is $6,208.64.

THE authorities of Walkerville, Can., have closed a contract with the Windsor Gas Company for the lighting of the streets of the first named place, by means of incandescent gas lamps. The lights are to be kept up on a moontable basis, the rate is $19.50 each per annum, and the contract is to run for 5 years.

THERE seems to be some doubt as to whether the gas works proposed for Delray, Mich., will be built this year, for the reason that work thereon under the franchise agreement, which was to have been commenced within 3 months from its signing, is not yet underway.

THE Sheboygan (Wis.) Arc Gas Lamp Company has been incorporated by Messrs. John K. Russell, W. F. Clausen and Simon Gillen. The Company proposes to put on the market a lamp devised by Messrs. Russell and Clausen. The first named is Superintendent of the Sheboygan Gas Company. The capitalization of the new concern is $25,000.

MR. C. D. WOODRUFF, formerly Manager of the Citizens Gas Company, of Bridgeport, Conn., has been appointed Chief Engineer of the Spanish-American Light and Power Company, Havana, Cuba.

IT is reported that a controlling interest in the Sandusky (O.) Gas and Electric Light Company has been secured by parties identified with the Everett-Moore street railway combination, whose headquarters are in Cleveland.

THE gas and electric lighting plants of Tucson, Arizona, were badly damaged by a severe storm of wind and rain which swept that city about a fortnight ago. The storage holder was overturned, and the gas supply was cut off for several days.

WE are advised that the authorities of Adrian, Mich., have finally granted an extension of the Adrian (Mich.) Gas Company's charter for a period of 30 years. Under the agreement the Company bound itself to sell gas for illuminating use at $1.60 per 1,000 cubic feet, the rate for fuel gas to be $1.30 per 1,000. Prompt payment (within 10 days of the presentation of bills) entitles the consumer to a rebate of 10 cents per 1,000.

A QUEER suit has been brought against the St. Paul (Minn.) Gas Light Company by Mrs. Elizabeth Staehle, who asks that defendant be compelled to pay her the sum of $5,000 for damages to person. In her complaint she avers that an agent of the Company visited her house for the purpose of reading the meter, which is located in the cellar of the premises. On leaving the premises the agent failed to close the trap door leading to the cellar, which door she asserts was down when he called. Some time after the agent's departure, plaintiff fell through the opening, sustaining severe bodily injuries; hence her demand for recompense because of the agent's negligence.

THE proprietors of the Springfield (Mass.) Gas Light Company say that the dollar selling rate in that city will be reached not later than January 1st next.

THE proprietors of the Amesbury and Salisbury (Mass.) Gas Light Company are arranging for the extension of its mains to Salisbury Beach, a nearby summer residence district, where a good business on account of a fuel gas supply could be secured.

THE Detroit City (Mich.) Gas Light Company will locate its new storage holder on property recently secured by it on River street.

A CORRESPONDENT in Clinton, Mass., fowards the following under date of the 19th inst.: "The Board of Gas and Electric Light Commissioners set the 4th prox. as the date for a hearing in the case of the Clinton Gas Light Company vs. The Bigelow Carpet Company, of Clinton. The matter in dispute may be gleaned from the following. The Carpet Company some time ago petitioned the Board of Selectmen to lay wires across School and Main streets, and the Gas Company remonstrated. The petition, however, was granted, whereupon the Gas Company appealed to the Commissioners. While the appeal was pending a hearing the Bigelow Company laid its conduits, and, disregarding an injunction issued by the Superior Court, its agent, Mr. E. W. Burdette, was committed to jail for 20 days, and the Company and two of its employees were fined in sums amounting to a total of $2,200. The matter will be tried on its merits before the Board at a public hearing, and the consensus of opinion in the city is that the Bigelow Company has a poor case."

THE scheme for the placing of an opposition gas company in Bloomington, Ills., does not seem to possess much vitality. In fact the project may be considered as dead.

MESSRS. THOMPSON, TENNEY & THOMPSON, of New York, have succeeded in purchasing the minority interest in the Springfield (Mass.) Gas Light Company, the holders of which refused to sell at the price ($185 per share) paid some months ago for the majority interest. It is said that the holders-out got $200 per share for their stock.

THE Cincinnati Gas and Electric Company will extend its mains to the outlying village of Elmwood Place, by virtue of an ordinance passed about a fortnight ago. The Company agrees to supply gas for illuminating and fuel use at the rates which prevail in Cincinnati—75 cents and 50 cents per 1,000, respectively.

THE main system of the Harrisburg (Pa.) Gas Company is being renewed and largely extended. The increased and increasing demands for gas in Harrisburg are really phenomenal.

A CORRESPONDENT in Chicago, Ills., forwards the following, under date of the 17th inst.: "The August meeting of the City Council of Morris, Ills., was notable for the settlement of the gas question in that thriving place. At a previous meeting it had been agreed that the petition of the grantors to establish a gas works in Morris, with the understanding that the selling rates should not exceed $1.75 per 1,000 for an illuminating supply and $1.60 per 1,000 on fuel account, should be accepted. Mayor Dawson vetoed the measure, his objection being that the named rates were too high. At the meeting under consideration the veto was discussed, and when the debate was ended the franchise was passed over the veto. Ald. Mathews was the only one who voted to sustain the Mayor.

MR. W. H. FROST, of Fort Scott, Kas., has applied to the City Council of Oklahoma City, Oklahoma, for the right to there construct and operate a gas plant.

MR. GEORGE S. BARROWS, oldest son of the late Col. W. E. Barrows, has been appointed to the vacancy, occasioned by his father's death, on the Board of Directors of the Philadelphia and Suburban Gas Company.

THE Consumers Gas Company, of Toronto, Can., has placed an important order for automatic charging and discharging apparatus in its new generating houses with Mr. G. A. Bronder, of this city.

THE Bridgeport (Conn.) *Standard*, of the 14th inst., had this to say: "The Citizens Gas Company, a million dollar corporation of Bridgeport, was sold under the hammer for $85,000 this noon. The sale was made in exactly 3 minutes after the bidding began. The only bidder was H. S. Weed, one of the holders of the bonds issued by the Company, who represented his own interest and the interests of other bondholders Other bondholders and officers of the Company, none of this city, were at the sale. The only Bridgeporter present, in the possible capacity of

(*Concluded on page* 334.)

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PROPRIETORS.

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England—Aug. Siegle, 30 Lime Street, London.

MONDAY, AUGUST 26, 1901.

(*Continued from page* 333.)

prospective purchaser, was Attorney Carl Foster, who did not care to state the name of the party whom he represented. President Charles Sherwood, of the Bridgeport Hydraulic Company, was present as a spectator. The sale of the Company was made under a foreclosure decree issued by the Superior Court in favor of the Knickerbocker Trust Company, of New York. Frank Miller was appointed a committee to sell the plant. He is known as a hustler, and he sustained his reputation in the sale this morning. Mr. Miller, Goodwin Stoddard, his counsel; the successful bidder, the latter's counsel, Attorney Jollingbeck, of New York, and a half dozen others, entered the Company's office in the Court Exchange building at 12:05. Two minutes later, Mr. Weed had a consultation with his counsel, and then the latter asked if there was any reason for not proceeding at once with the sale. Mr. Stoddard said it was deemed best to wait a few minutes for possible late comers, and then he consulted Mr. Miller. The referee said the sale could go on. Attorney Stoddard read over a list of the Company's assets, rights, licenses, etc., per the order of the court, and the conclusion was that the whole lot would be sold free of incumbrance to the highest bidder. Mr. Miller called for bids. Mr. Weed offered $85,000 and no one else spoke for a minute. The one, two, three call was given, and Mr. Miller declared the Company sold to Mr. Weed. That gentleman went to the inner office of the Company, wrote a check for $85,000 and turned it over to the referee. 'A simple business transaction,' said Attorney Jollingbeck afterwards, 'and it cannot be considered anything else.' He would not say whom his client represented, and Mr. Weed had nothing to say for himself. One of the other bondholders gave out the information concerning the buyer, and for whom he appeared.

"It was not necessary for Mr. Weed to have paid cash for the plant, as the order of referee permitted a 10 per cent. deposit and the balance within 7 days. Moreover, the sale will not be complete until the superior court puts its stamp of affirmation upon it. How soon the affirmation will be applied for could not be ascertained, probably not until the court convenes in September. As the sale is apparently satisfactory to the bondholders no opposition to the court approving it can reasonably be anticipated. Opposition might come from the stockholders, who had dropped nearly $1,000,000 in the deal, but the loss they had looked forward to, and, as some of them were present, it appeared that they were prepared to meet it. Incidentally, some of the stockholders are also bondholders. The $85,000 bid for the plant is to liquidate the mortgage judgment of $800,000, which with accrued interest and costs, reaches nearly $900,000. As the bondholders are the buyers, they will not stand losers. The plant was appraised at $900,000, and is believed to be worth that much or more by experts in the gas business. With the exception of $1,000 worth, all the stock in the Company is held by New Yorkers. They bought the charter for the Company from a number of Bridgeporters 6 years ago and created the plant. It was a failure from the start, as it manufactured fuel gas exclusively, and the manufacturers did not give the Company the support it anticipated. To-morrow the option of William G. Thorne on the stock of the Bridgeport Gas Light Company will expire, and as fully three-fourths of the stockholders have accepted Mr. Thorne's terms, the Company will pass into the control of new owners. Mr. Thorne has not disclosed the name of his backer, but that it is a substantial party is evident from the offer of three for one for the Company's stock. While no official confirmation has been given the report, it is considered as well-founded that the owners of the Citizens Company will come into possession of the other and older corporation, consolidating the fuel and illuminatiing gas plants in management. A stockholder in the Bridgeport Company who has offered his stock on Mr. Thorne's terms, said that he would not be surprised if it were discovered soon that the United Gas Improvement Company, of Philadelphia, was the real purchaser of both gas plants, buying the Citizens Company from the bondholders and the other Company outright."

A CLUTCH for producing a reverse motion on gas engines is the latest invention of Wm. J. Wright, of Pittsburg, Pa., and a practical test has been made with it on power for oil well purposes with most satisfactory results. The chief advantage for use in the oil fields is that of being able to pump, pull rods and tubing, and clean out wells by gas engine power. The pumping attachment which is bolted to the jack post has pulley for bull rope, and in pumping requires only the regular walking beam. The clutch is attached to any gas engine, and can be made of any strength desired. Producers who are now using gas engines for pumping cannot afford to be without this reversing appliance, which is also applicable for mining hoists, elevators, etc., where a reverse motion is required.

The Market for Gas Securities.

Under the influence of brisk trading in city gas shares for this time of the summer season, Consolidated sold up to 225¾, which price was made at the closing the afternoon of to-day (Friday). There was quite a bit of rumoring in connection with the advance, but none of the stories were related to the matter which should be the vital one in causing the stock to move up sharply. As we have been saying for months, the most important near development must be the determining of the Company's future relations with the Brooklyn Union Company, and that determination cannot, so far as the public is concerned, be much longer delayed; that is, if it is to be accomplished in the time of Mr. Sloan. The Company declared its regular quarterly dividend of 2 per cent. It is payable September 16th and the books close to-morrow. Other city gas shares are dull, although Standard common is in demand. City gas bonds seldom appear on the market.

Brooklyn Union is nominally unchanged, and to us it seems a decided purchase at the quoted figures. Peoples, of Chicago, has held its own fairly well during the week, and the same may be said of Baltimore Consolidated. The Connecticut Lighting and Traction Company has likely secured control of the gas interests of Bridgeport, and its next move possibly will be to secure proprietorship of the New Haven (Conn.) Gas Light Company.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

AUGUST 26.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	225⅞	226
Central Union, Bonds, 5's.	3,000,000	1,000	109	110
Equitable Bonds, 6's	1,000,000	1,000	105	
" 1st Con. 5's	2,300,000	1,000	115	118
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	305	315
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	.
New Amsterdam Gas Co. .. Bonds, 5's	11,000,000	1,000	108¾	109¼
Northern Union, Bonds, 5's.	1,250,000	1,000	106	108
New York and East River .. Bonds 1st 5's	3,500,000	1,000	111	115
" 1st Con. 5's	1,500,000	..	108	111
Richmond Co., S. I.	348,650	50	100	..
" Bonds	100,000	1,000	103	..
Standard	5,000,000	100	135	..
Preferred	5,000,000	100	153	..
Bonds, 1st Mortgage, 5's	1,500,000	1,000	113	115
Yonkers	299,650	500	130	.
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	215	217
" " Bonds (5's)	15 000,000	1,000	118	119
Bay State	50,000,000	50	..	1
" Income Bonds	2,000,000	1,000	.	75
Binghamton Gas Works	450,000	100	30	40
" 1st Mtg. 5's	509,000	1,000	92½	95
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	6	8
" " Bonds, 5's	5,250,000	1,000	73	76
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	.	
Central San Francisco	2,000,000	..	106	108
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼

Cincinnati Gas & Elec. Co.	29,500,000	100	104½	104¾
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	106	107
Columbus (O.) Gas Lt. & Heating Co	1,682,780	100	60	65
Preferred	3,026,500	100	84	86
Consumers. Jersey City Bonds	600,090	1,000	102	103
Consumers, Toronto	1,700,000	50	215	216
Consolidated, Baltimore	11,000,000	100	65½	65¾
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	12	14
" Con. Mtg. 5's	380,000	1,000	81½	83
Consolidated G. & E. Co.'s., Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50		89
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	381,000	1,000	89	89½
" Inc. 5's	16,000	100	94	94½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	34	38
Fort Wayne	2,000,000	..	..	.
" Bonds	2,000,000	..	54	58
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	102	104
Hartford	750,000	25	240	250
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	50	60
" Bonds, 6's	2 650,000	..	99½	101
Jackson Gas Co	250,000	50	65	70
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	26
Bonds, 1st 5's	3,822,000	1,000	101½	103
Laclede, St. Louis	10,000,000	100	91	95
Preferred	2,500,000	100	100	102
Bonds	10,000,000	1,000	..	108½
Lafayette Gas Co., Ind.	1,000,000	100		60
Bonds	1,000,000	1,000	48	55
Louisville	2,570,000	50	110	120
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	102½	108
" 6 per cent. scrip, due 1910	100,000	25	87	89
Montreal, Canada	2,000,000	100	182	184¾
Newark, N. J., Con. Gas Co	6,000,000	..	..	55
Bonds, 6's	4,600,000	..	..	103
New Haven	1,000,000	25	280	300
Nashville Gas Lt. Co.	1,000,000	50	110	..
Oakland, Cal.	2,000,000	..	46	47
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	113¼	113⅜
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	46	46½
St. Paul Gas Light Co.	1,500,000	100	60	63
1st Mortgage 6's	650,000	1,000	82	85
Extension, 6's	600,000	1,000	..	..
General Mortgage, 5's	2,465,000	1,000	88	90¼
St. Joseph Gas Co.				
" 1st Mtg. 5's	751,000	1,000	85	87
Syracuse, N. Y.	1,750,000	100	17	19
Bonds	1,612 000	1,000	91	93
Washington, D. C	2,600,000	20	298	300
First mortgage 6's	600,000	..	..	..
Western, Milwaukee. Bonds, 5's	4,000,000	..	106	108
Wilmington, Del.	600,000	50	210	215

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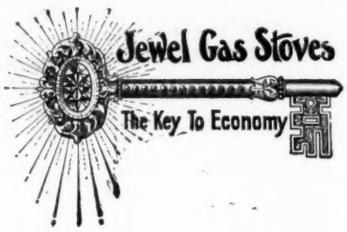

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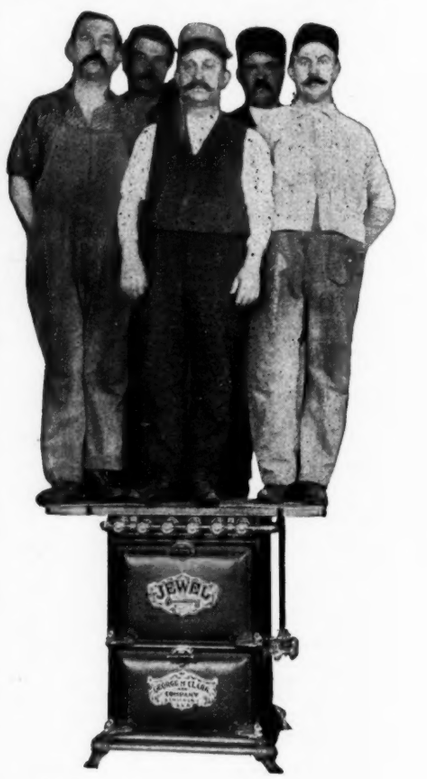

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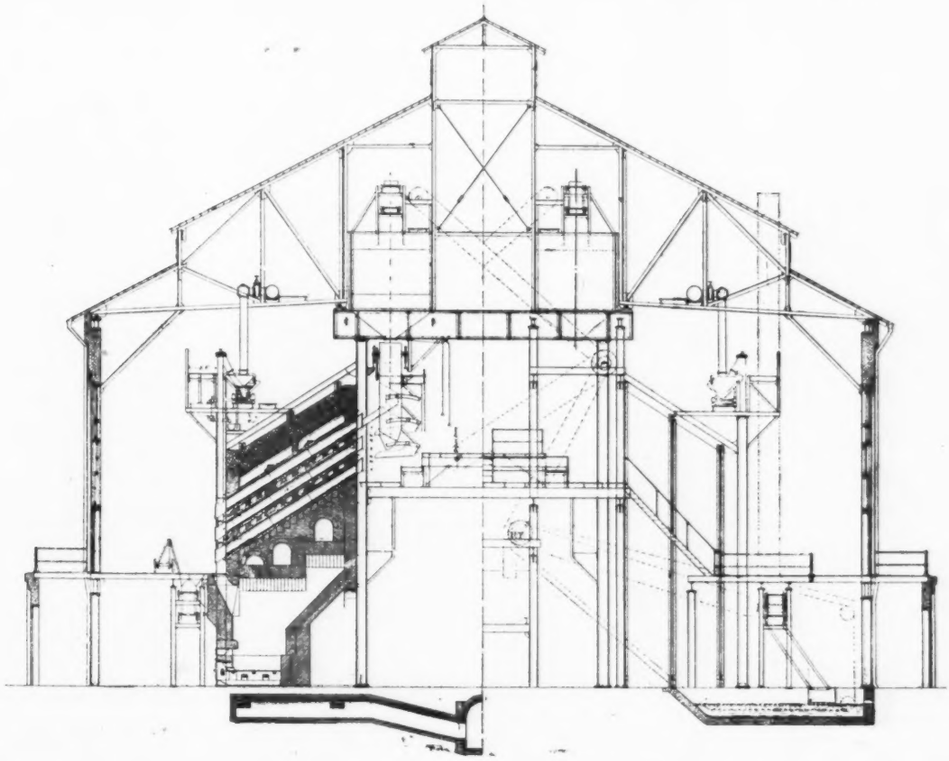

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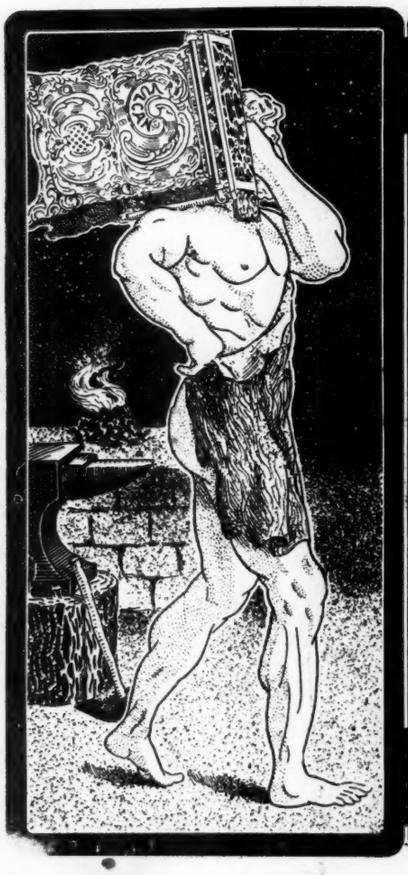

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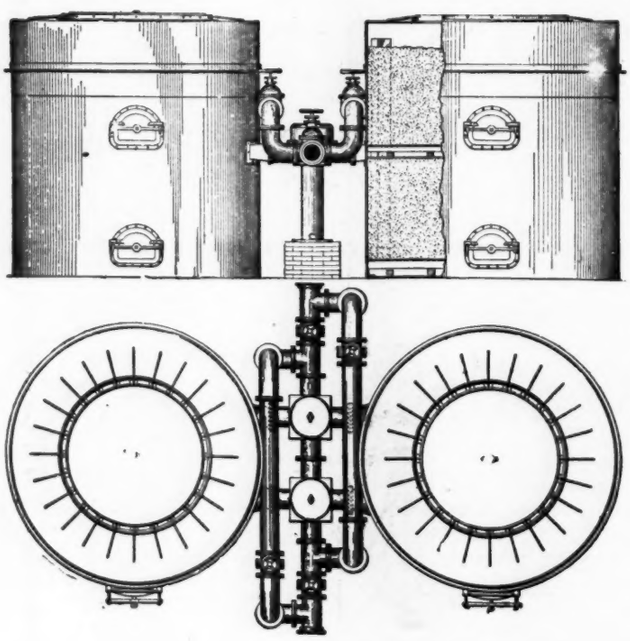

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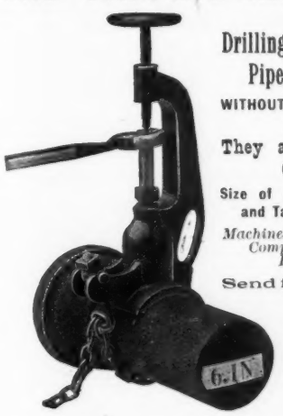

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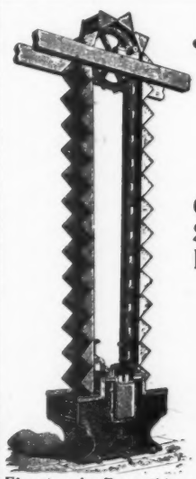

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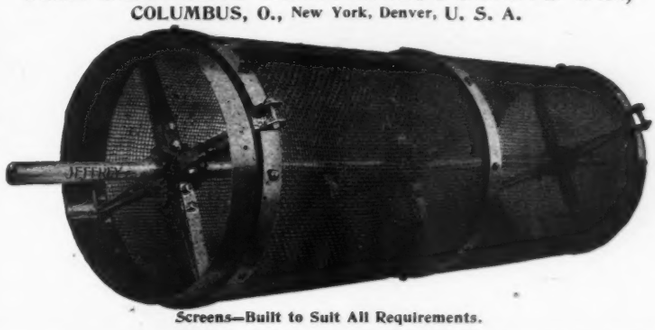

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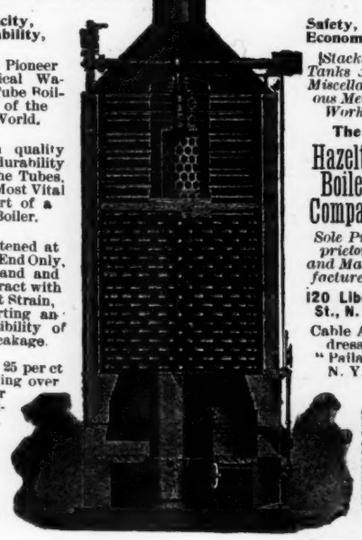

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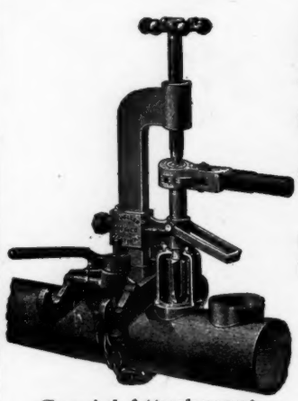

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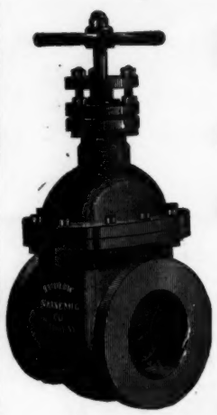

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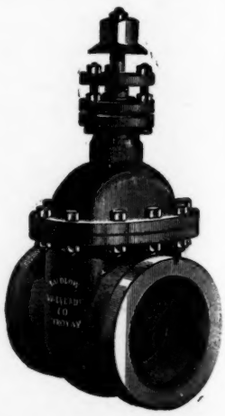

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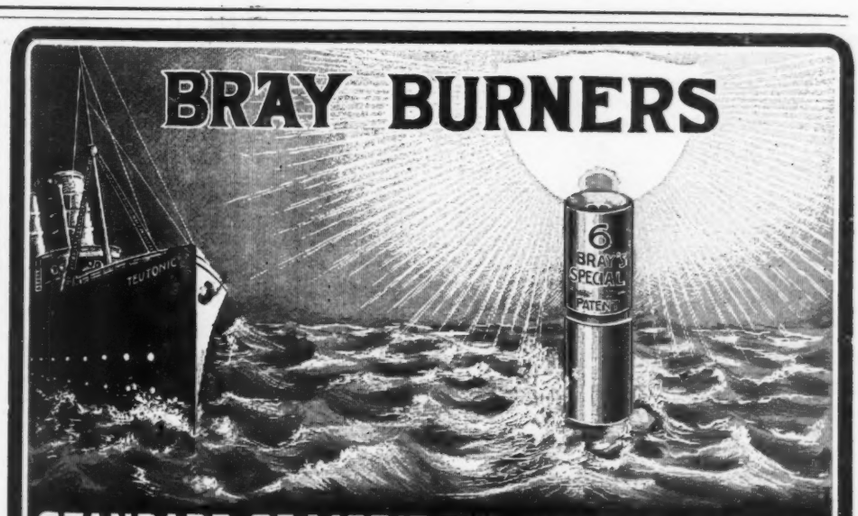

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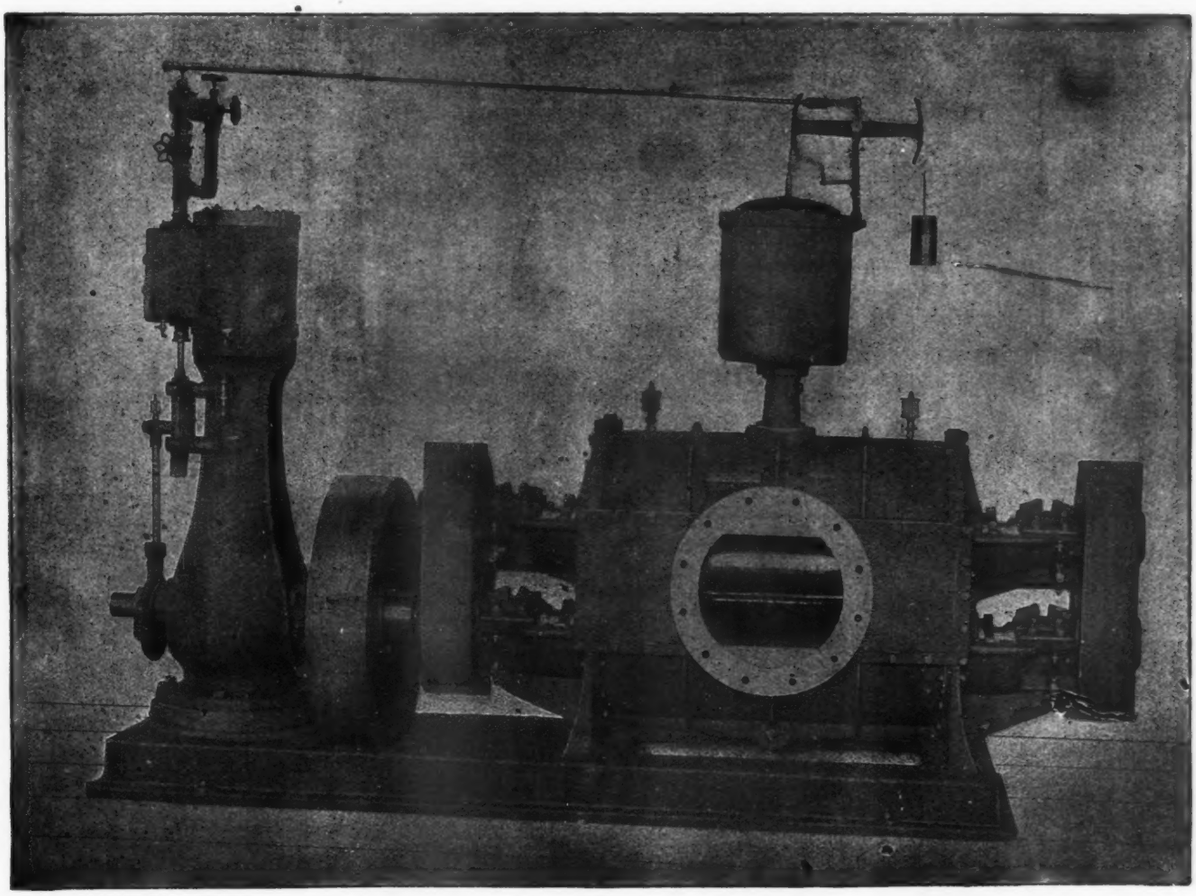

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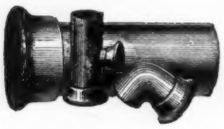

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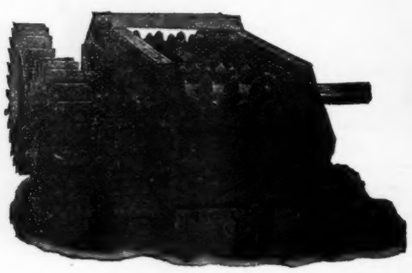

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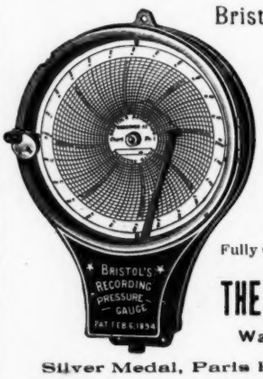

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ROBINS CONVEYING BELT CO. 26 PARK ROW, NEW YORK.

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CHICAGO, ST. LOUIS,

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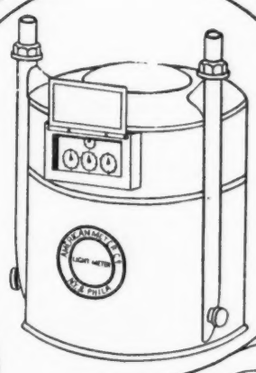
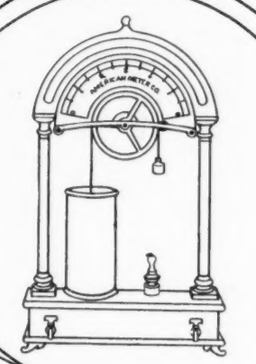
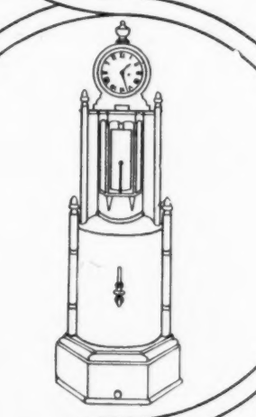
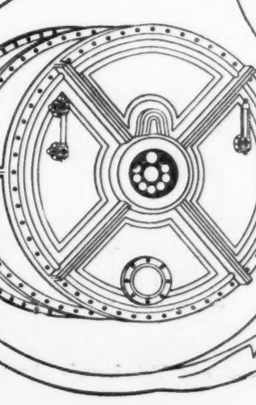




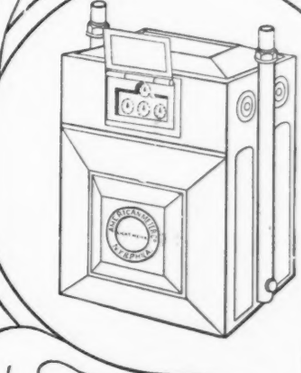


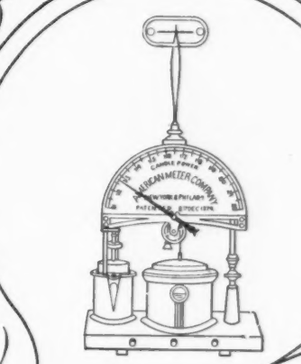


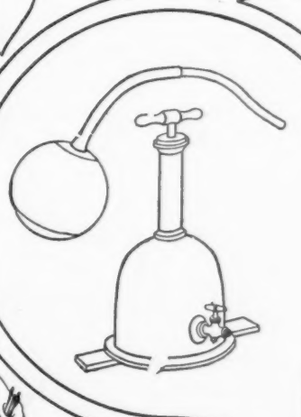
PUBLIC LIGHTING TABLE.

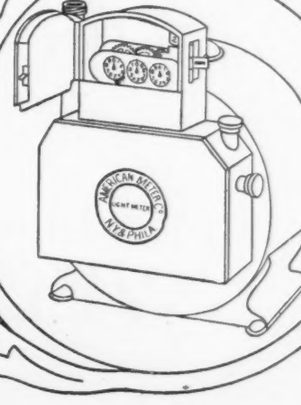
SEPTEMBER, 1901.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Extinguish	Table No. 2. New York City. All Night Lighting. Light.	Extinguish.
				P.M.	A.M.
Sun.	1	7.00 PM	9.00 PM	6.30	4.20
Mon.	2	7.00	9.40	6.30	4.20
Tue.	3	7.00	10.20	6.15	4.30
Wed.	4	7.00	11.10	6.15	4.30
Thu.	5	7.00 LQ	12.10 AM	6.15	4.30
Fri.	6	7.00	1.10	6.15	4.30
Sat.	7	7.00	2.10	6.15	4.30
Sun.	8	6.50	3.20	6.15	4.30
Mon.	9	6.50	4.40	6.15	4.30
Tue.	10	6.50	4.40	6.05	4.40
Wed	11	6.50	4.40	6.05	4.40
Thu.	12	6.50 NM	4.40	6.05	4.40
Fri.	13	6.50	4.40	6.05	4.40
Sat.	14	6.50	4.40	6.05	4.40
Sun.	15	6.40	4.40	6.05	4.40
Mon.	16	6.40	4.40	6.05	4.40
Tue.	17	7.30	4.40	5.55	4.50
Wed.	18	8.10	4.40	5.55	4.50
Thu.	19	8.50	4.40	5.55	4.50
Fri.	20	9.40 FQ	4.40	5.55	4.50
Sat.	21	10.40	4.40	5.55	4.50
Sun.	22	11.40	4.50	5.55	4.50
Mon.	23	12.40 AM	4.50	5.55	4.50
Tue.	24	1.50	4.50	5.40	5.00
Wed.	25	2.50	4.50	5.40	5.00
Thu.	26	No L.	No L.	5.40	5.00
Fri.	27	No L. FM	No L.	5.40	5.00
Sat.	28	No L.	No L.	5.40	5.00
Sun.	29	6.10 PM	7.40 PM	5.40	5.00
Mon.	30	6.10	8.20	5.40	5.00









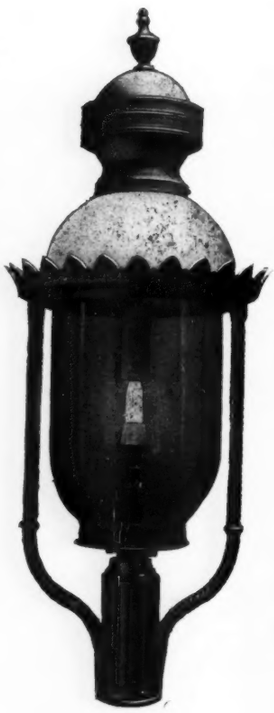
TOTAL HOURS LIGHTING DURING 1901.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	220.10	January	423.20
February	192.30	February	355.25
March	180.00	March	355.35
April	158.30	April	298.50
May	140.40	May	264.50
June	135.40	June	234.25
July	138.00	July	243.45
August	156.20	August	280.25
September	174.40	September	321.15
October	202.30	October	374.30
November	220.40	November	401.40
December	241.30	December	433.45
Total, yr.	2161.10	Total, yr.	3987.45

NEW YORK, 33 Nassau Street. PHILADELPHIA, Broad and Arch Streets. CHICAGO, Foot of Orleans Street. BOSTON, 624 Tremont Building.
CLEVELAND, 809 Cuyahoga Building. ST. LOUIS, 712 Roe Building. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



No. 36.

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Welsbach System of Street Lighting,

Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

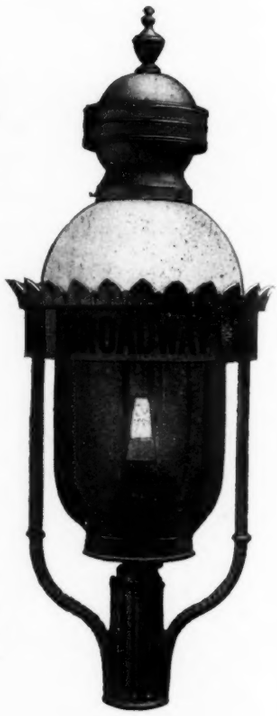
POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others Interested in Municipal and Outside Lighting.



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THE INCOMPARABLE

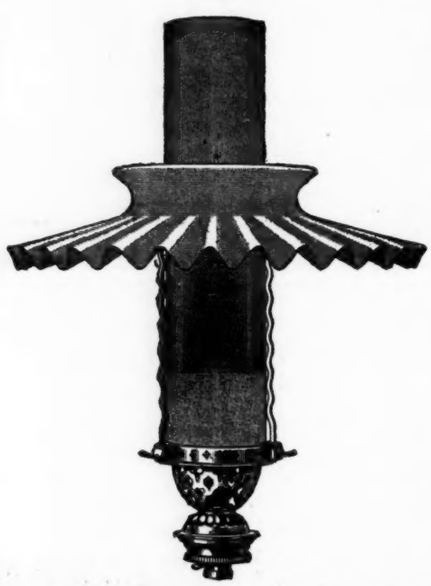
"YUSEA" Welsbach MANTLE

FINEST EXAMPLE

OF INCANDESCENT

GAS LIGHT

EVER EXHIBITED.



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Under Contract, 1901:

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Works, Weber, N. J.

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Standard Fire Brick and Gas Retorts.

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RETORT WORKS

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OFFICE, 418 to 422 East 23d St., N. Y.

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BENCH SETTINGS,

Fire Brick, Tiles, Etc.

GEROULD'S IMPROVED RETORT CEMENT

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

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In Kegs, 100 to 200 " " 6 " "
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We have studied and perfected three important points. Our retorts are made to stand changes of temperature, the strongest heats of the furnace, and the abrasion of feeding and emptying. We construct

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Containing 6, 8 or 9 Retorts.

We have Greatly Improved our Recuperators. Coal or Coke can be used as Fuel in Furnaces.

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Sole Agents for New England States.

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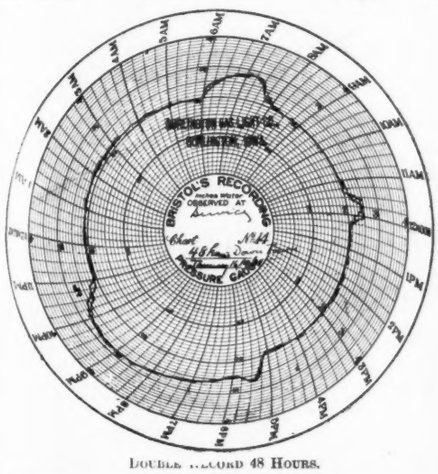

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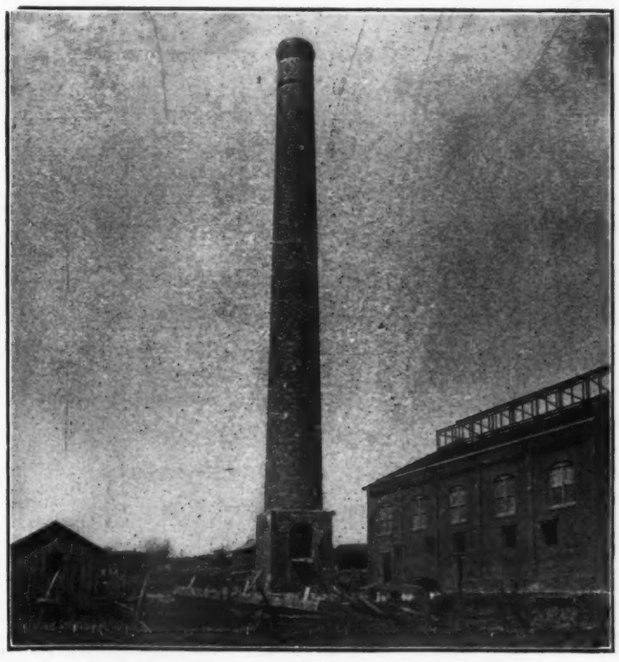
Designers and Builders of Chimneys of Perforated Radial Bricks.



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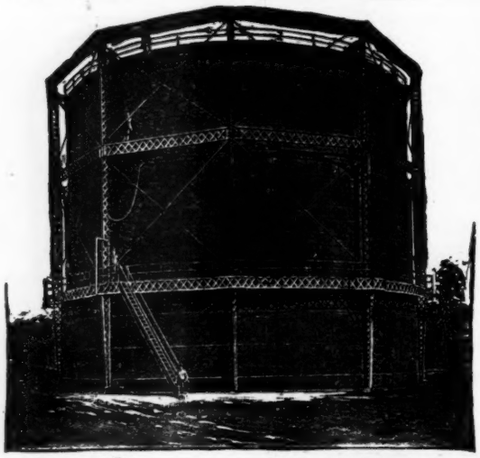

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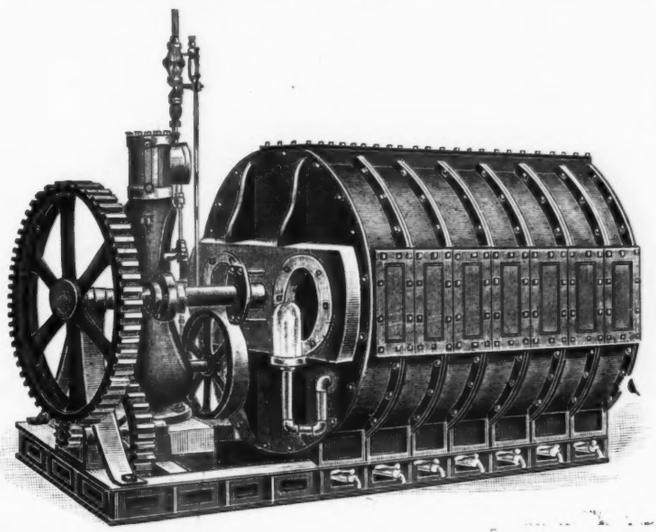

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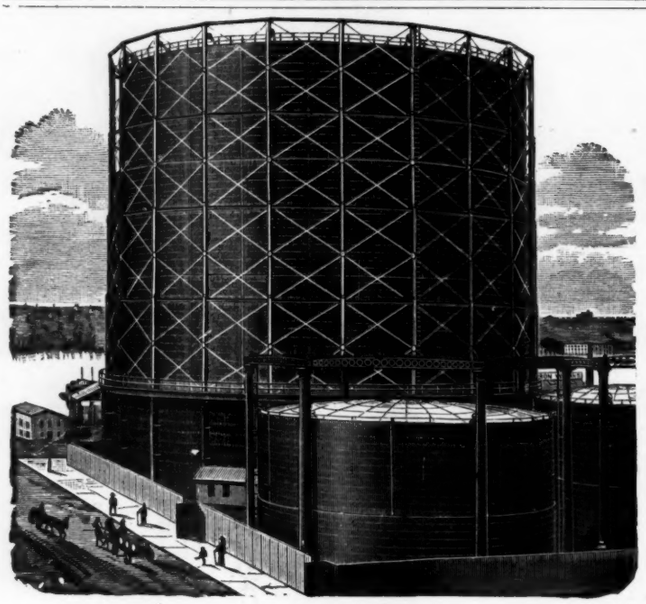

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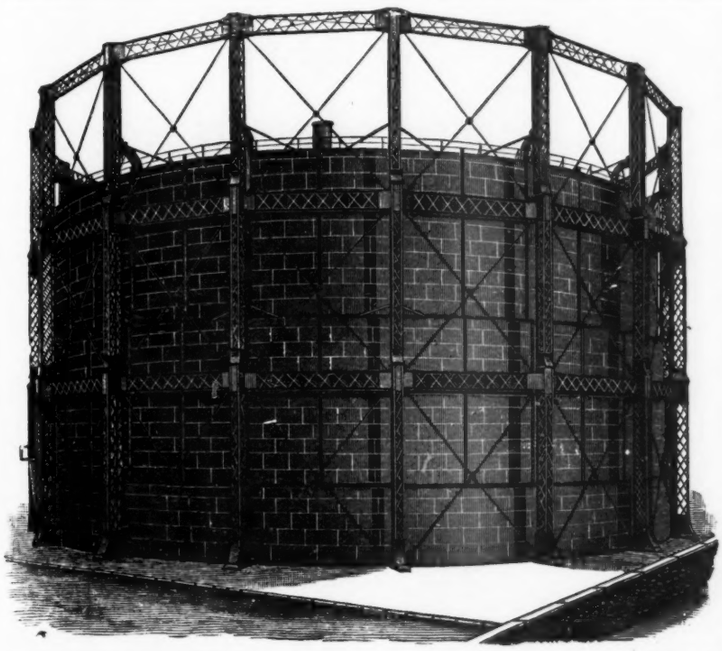

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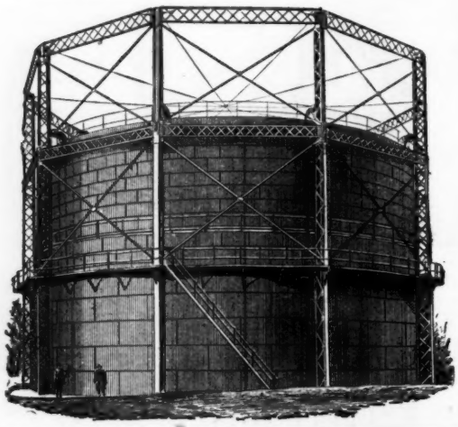

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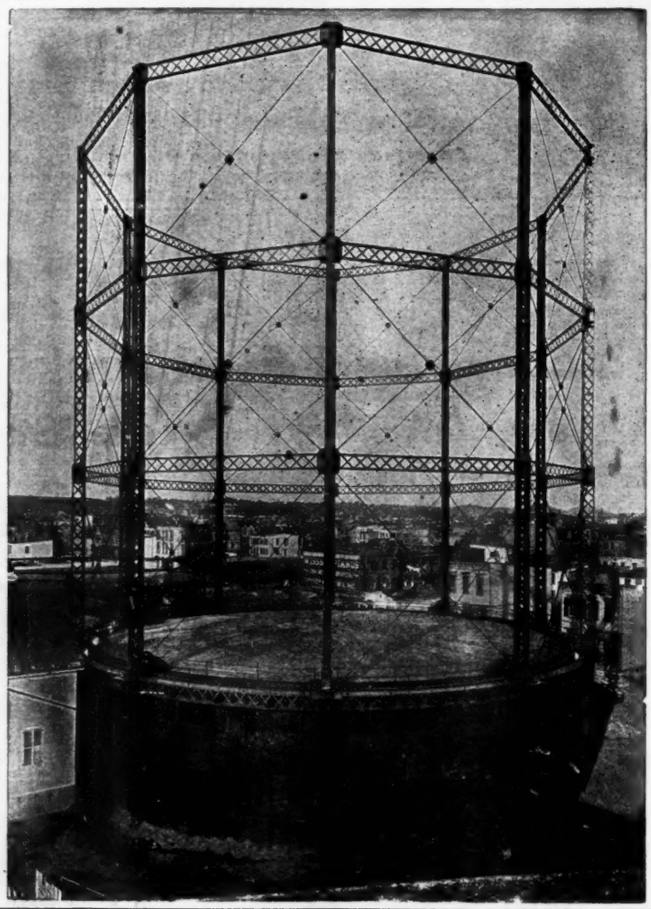

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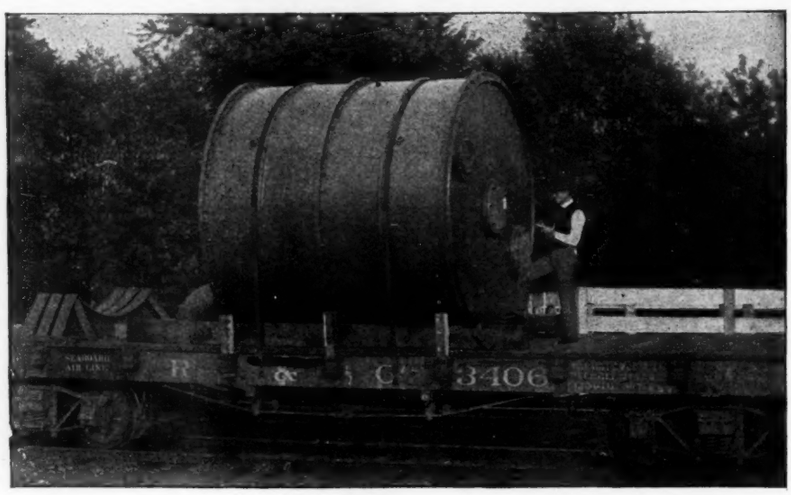

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